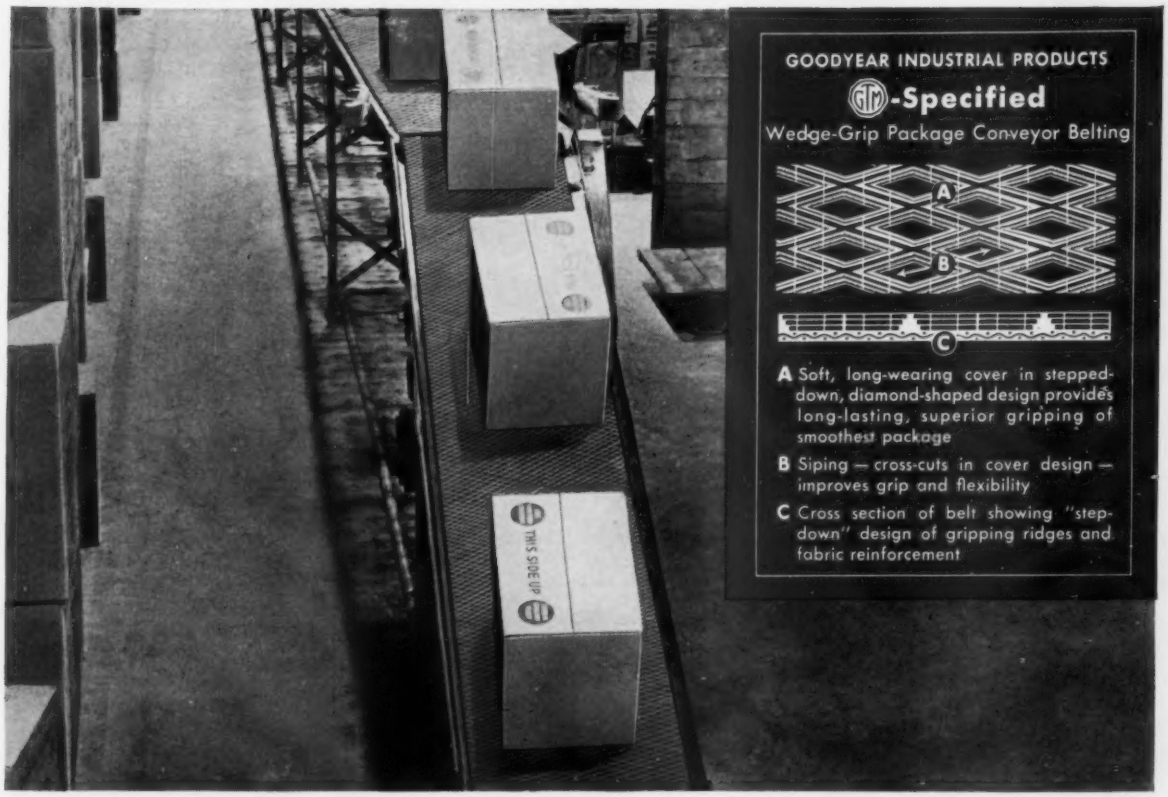
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Wedge-Grip Package Conveyor Belting
A
B
C
A Soft, long-wearing cover in stepped-down, diamond-shaped design provides long-lasting, superior gripping of smoothest package
B Siping — cross-cuts in cover design — improves grip and flexibility
C Cross section of belt showing "step-down" design of gripping ridges and fabric reinforcement
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'ROUND ABOUT with the editors in field and office

Edited by R. L. Marinello

New Appointment at Glidden Co.

James W. Pollard, Jr., was appointed chief engineer of The Glidden Co., Cleveland, Ohio. In his new capacity he will have full responsibility for all design, engineering and construction work throughout the entire company. In addition he will be responsible for the development of an integrated engineering staff in each of the five major divisions of the company.

A native of Tennessee and a graduate in mechanical engineering, he has had very extensive experience in design and construction operations in various phases of the chemical processing field. He joined the company in 1948 and has served in a succession of important engineering positions since that time.

Research Service for Users of Electron Microscopes

USERS OF electron microscopes can avail themselves of the technical research service recently established by Radio Corporation of America, Camden, N. J. Research service will consist of assistance in the solution of medical, biological and industrial microscopy problems.

John J. Kelsch will be the scientist in charge of this new service division. He will work closely with electron microscope users to provide technical assistance in the development of new microscopy application and techniques and in the solution of specific application problems.

Retirement-Promotion at Norton

Arnold R. Jones has been appointed superintendent of mechanical construction and maintenance at the Norton Co., Worcester, Mass. He is taking over the duties of John W. Johnson who recently retired.

Mr. Jones graduated from Worcester Polytechnic Institute in 1943 and joined the company in 1946. He served in the plant engineering department for nine years as a layout engineer, lubrication engineer and staff engineer. In 1955, he was appointed general foreman of crafts and in January, 1956, he was named assistant superintendent of mechanical construction and maintenance.

Plant Engineering Promotions

Jerry H. Stuart, has been appointed chief design engineer and **Thomas M. Shea** has been appointed chief plant engineer of Merck Sharp & Dohme, Division of Merck & Co., Inc., Philadelphia, Pa.

Stuart, formerly a senior project engineer, will have charge of the design and major construction of new plant facilities in his new capacity. He received his B. S. degree in engineering from the University of California. Before joining the company in 1950, he was employed by the Grasselli Chemicals Division of E. I. du Pont de Nemours & Co., Inc., as construction and repair supervisor and the Reynolds Works of the Atlas Powder Co. as assistant plant engineer.

Shea will now have charge of the maintenance, operation of boiler plants and services at the company's Philadelphia and West Point, Pa., plants. He received his B. M. E. degree from Pratt Institute in Brooklyn, N. Y.

J. H. Stuart

T. M. Shea

Both men report to Chief Engineer **John M. Waligora,** who is a member of the Greater Philadelphia Chapter of the American Institute of Plant Engineers. He was recently elected national president of the AIPE. Portions of his talk, presented at the AIPE All Engineers' Luncheon, appear on page 107 of this issue.

Plant Maintenance Conference Goes West Again

PLANT ENGINEERS in the western states will have an opportunity to compare notes on equipment, plant operations and maintenance procedures at the Third Western Plant Maintenance and Engineering Con-

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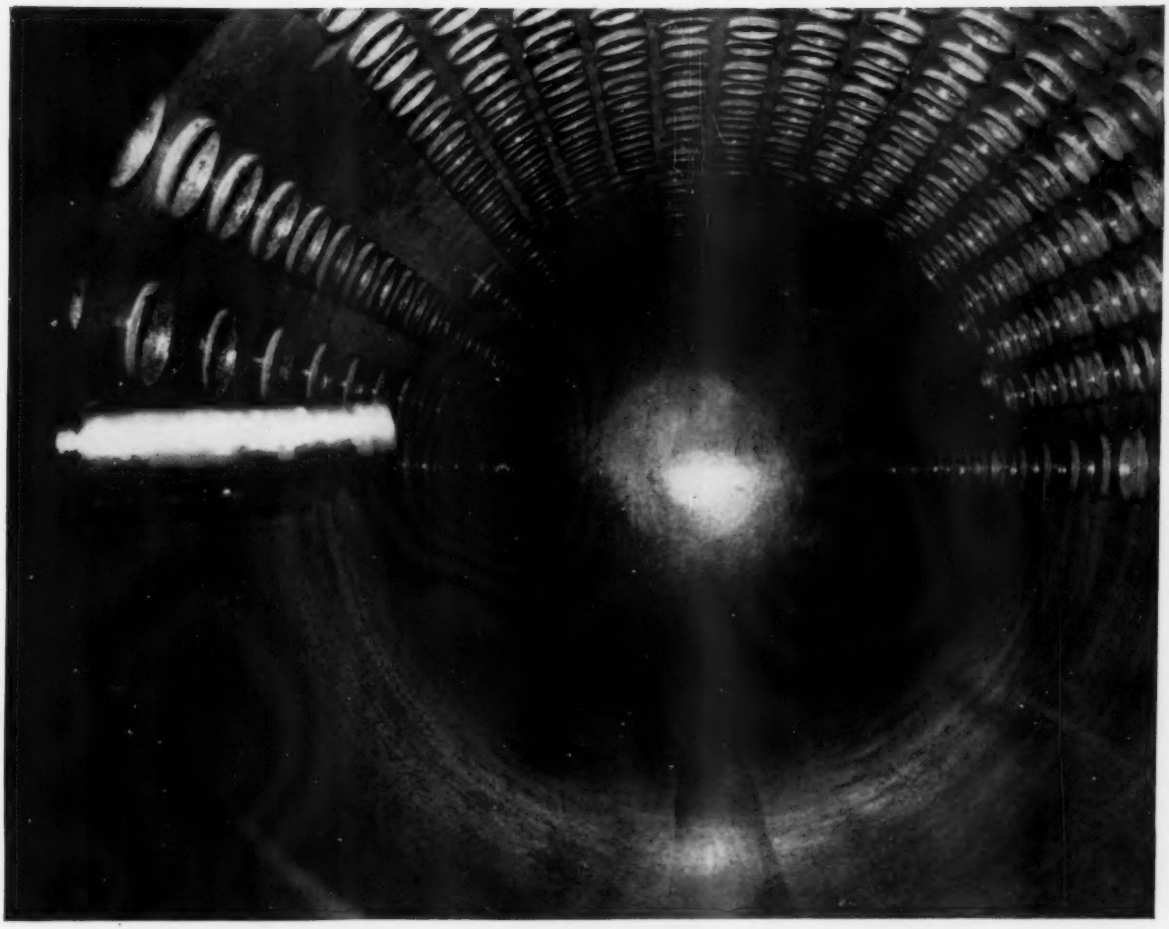

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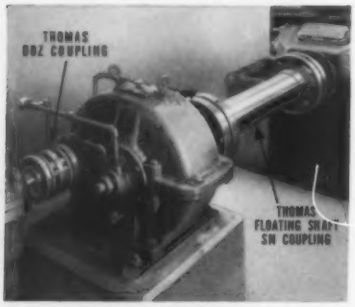

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'ROUND ABOUT

ference and Show. This year, the conference and show will be held in San Francisco at the Civic Auditorium on June 11th, 12th and 13th.

The conference program will emphasize the new problems which confront plant engineers as a result of more and more automatic equipment being placed on the production line. In addition, plant engineers will relate experiences regarding maintenance in small, medium and large plants, lubrication practices, maintenance of electrical and lighting equipment, and many other subjects.

Engineering Changes at Roebling

Herbert S. Hunt, assistant chief plant engineer, recently retired from active employment at John A. Roebling's Sons Corp., Trenton, N. J.

Charles H. Burden, former chief project engineer, succeeds Hunt as assistant chief plant engineer.

In other plant engineering changes, as announced by Chief Plant Engineer **F. A. French, William E. Zelley** has been named chief project engineer, electrical; **E. M. Yard,** chief project engineer, mechanical; and **Earl Slaper,** chief project engineer, construction.

Additional promotions include **William Lovelett** to the position of division plant engineer, Steel Wire Mills; **C. S. Lewis,** as assistant chief project engineer, mechanical; **M. K. Piper,** combustion engineer; and **A. M. Buchanan** as assistant chief project engineer, electrical.

All divisional plant engineers report directly to Burden who, with his three chief project engineers, is responsible for all engineering functions in both the central and divisional plant engineering offices.

Materials Handling Show

THEME FOR THE 1957 Materials Handling Exposition will be "Materials Handling, Key to Automation." It will be held at Convention Hall, Philadelphia, from April 29 through May 3.

Concurrently with the show, the American Material Handling Society will conduct an extensive conference to discuss new developments in handling methods.

The conference will open with a discussion of new perspectives in manufacturing with automatic handling equipment followed by discussions on the new look in shipping; eliminating warehouses; organizing a handling program; the effect of handling systems on plant design and layout; selecting and buying handling equipment, as well as getting maximum usage from it.

Sig Simonson Receives "Management Man of the Year Award"

Sig Simonson, plant engineer with Chicago Hardware Foundry Co., North Chicago, Illinois, was presented recently with the Management Man of the Year Award. The award is given to people who have an active community spirit and not only spearhead company-sponsored extra-curricular programs, but are active in a number of other community projects, school boards, welfare agencies and service clubs.

Inscription on the award reads: "For his participation and leadership in the company and community endeavors and who by his conduct has done much to promote the appreciation of management as a profession."

One of the community projects to which Sig contributed his time and engineering know-how was with the Victory Memorial Hospital. When it was decided to enlarge the hospital, the local chapter of the Illinois Society of Professional Engineers were asked to name one of their members who could do a good job as chairman of the Building and Grounds Committee. Sig was selected for the job.

Another contributing factor of Sig's selection was his activity with local engineering societies. He was a charter member of the Chicago Plant Engineers' Society and later was instrumental in organizing and serving as the first president of the Northern Illinois Plant Engineers' Society. Both of these groups are chapters of the national organization—the American Institute of Plant Engineers. He also served as national secretary of the AIPE in 1955. In addition, he has held all the offices in the local chapter of the Professional Engineers' Society.

F. J. Sherwin, President of Chicago Hardware Foundry Co., presents award to Sig Simonson for his participation in numerous community activities

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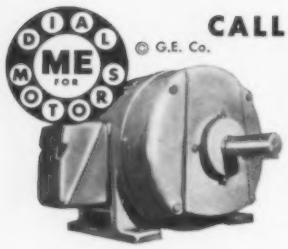

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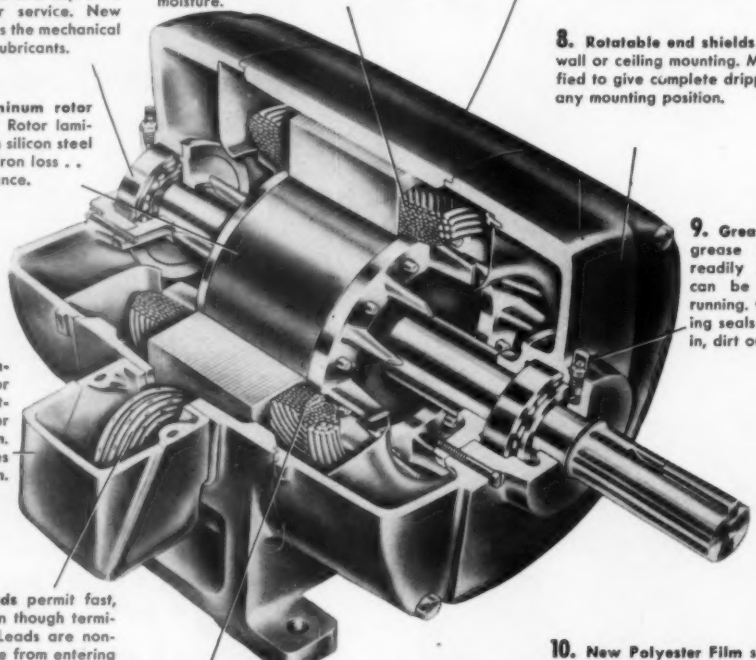

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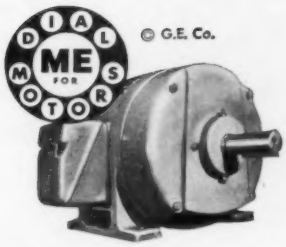

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Power Elec. Co., 5-8361

MISSOURI
JOPLIN
General Elec. Supply Co., MA 4-5622
KANSAS CITY
Graybar Elec. Co., BA 1-1644
Independent Elec. Machinery Co., GR 1-2610
ST. LOUIS
General Elec. Supply Co., JE 1-3000
Graybar Elec. Co., JE 1-4700

MONTANA
BILLINGS
General Elec. Supply Co., 9-4559

NEBRASKA
OMAHA
General Elec. Supply Co., JA 0456
Graybar Elec. Co., WE 7676
Schneider Elec. & Equip. Co., WE 5550

NEVADA
RENO
Linnecke Elec. Sales Co., 3-3729

NEW HAMPSHIRE
MANCHESTER
General Elec. Supply Co., NA 5-5418

NEW JERSEY
CAMDEN
National Elec. Supply Co., EM 5-4330
NEWARK
General Electrical Equip. Co., BI 2-2305
General Elec. Supply Co., BI 2-1600
Graybar Elec. Co., MA 2-5100
NEW BRUNSWICK
A. Bishop Elec. Motor Exchange, KI 5-6446
PATERSON
General Electric Supply Co., LA 5-5100
Reliable Elec. Motor Repair Co., AR 4-7756
Watson-Flagg Sales Corp., LA 5-2324
TRENTON
General Elec. Supply Co., OW 5-3453
Thropp Elec. Sales Corp., JU 7-1441
WOODBURY
Industrial Pump and Supply Co., TI 5-7030

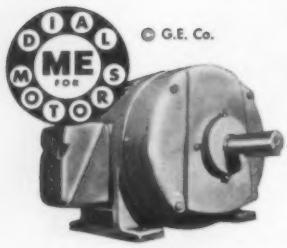
NEW MEXICO
ALBUQUERQUE
Electric Service Inc., 2-9447
General Elec. Supply Co., 2-5246

NEW YORK
ALBANY
Graybar Elec. Co., 5-1563
Havens Elec. Co., Inc., 4-1201
BROOKLYN
Apparatus Distributor, Inc., UL 2-4000
BUFFALO
General Elec. Supply Co., EL 5100
Graybar Elec. Co., WA 3700
ELMIRA
LeValley McLeod, Inc., 6163
GLENS FALLS
Glens Falls Elec. Supply Co., Inc., 2-5868
JAMAICA
Central Queens Elec. Supply Corp., RE 9-2020
LONG ISLAND CITY
Graybar Elec. Co., EX 2-2000
Motors & Armatures Inc., EX 2-3523
NEW YORK
Electric Motors Corp., CA 6-4665
General Elec. Supply Co., AL 5-3300
Hudson Elect. Sales Co., Inc., WO 2-3041
W. W. Grainger, Inc., CA 6-3810
POUGHKEEPSIE
Electra Supply Co., Inc., GL 2-9000
ROCHESTER
Electric Equip. Co., Div. Norry Elec. Co., GL 3-6070
General Elec. Supply Co., GR 3-5200
T. H. Green Elec. Co., HA 6-9840
SYRACUSE
M. H. Salmon Elec. Co., Inc., 73-3325
TROY
Tri-State Elec. Motors, Inc., AS 2-4250
UTICA
Langden & Hughes Elec. Co., Inc., 4-3154
Mather, Evans & Diehl Co., Inc., 4-6165

NORTH CAROLINA
ASHEVILLE
General Elec. Supply Co., 2-4481
CHARLOTTE
Armature Winding Co., ED 3-2158
General Elec. Supply Co., FR 5-5761

More G-E Distributors on next page . . .

GENERAL ELECTRIC



CALL THESE LOCAL DISTRIBUTORS FOR:

OFF-THE-SHELF DELIVERY OF G-E TRI-CLAD MOTORS

REG U.S. PAT. OFF.

(Continued from preceding page)

FAYETTEVILLE
General Elec. Supply Co., 2-5143
GREENSBORO
General Elec. Supply Co., 3-8207
GREENVILLE
General Elec. Supply Co., 5104
LAURINBURG
Electrical Equipment Co., 1196
RALEIGH
Electrical Equipment Co., TE 2-2039
General Elec. Supply Co., TE 3-4691

OHIO

AKRON
General Elec. Supply Co., FR 6-8195
Graybar Elec. Co., JE 5-4143
CANTON
General Elec. Supply Co., GL 4-5187
Jackson Bayley Elec. Co., GL 5-9421
CINCINNATI
General Elec. Supply Co., EL 1-2810
Graybar Elec. Co., MA 1-0600
CLEVELAND
Elliott Elec. Co., TO 1-2454
General Elec. Supply Co., HE 1-7280
Graybar Elec. Co., Inc., HE 2-2500
Strong, Carlisle & Hammond Co., TO 1-8800
COLUMBUS
General Elec. Supply Co., AX 9-1161
Graybar Elec. Co., CA 8-3811
Loeb Electric Co., AX 9-1142
DAYTON
General Elec. Supply Co., MI 0781
Graybar Elec. Co., MI 5665
HAMILTON
Wente Elec. Co., TW 4-8128
PORTSMOUTH
Genera Elec. Supply Co., EL 3-3196
TOLEDO
General Elec. Supply Co., Cherry 4-8661
Graybar Electric Co., EX 1641
YOUNGSTOWN
Economy Elec., Riverside 4-4461
General Elec. Supply Co., Riverside 6-6511
Graybar Elec. Co., Riverside 4-0124

OKLAHOMA

TULSA
General Elec. Supply Co., LU 4-2491
Graybar Elec. Co., MA 6-2121

OREGON

COOS BAY
Marshfield Elec. Co., Congress 7-6319
EUGENE
American Steel & Supply Co., 5-0373
MEDFORD
General Elec. Supply Co., 3-4519
PORTLAND
Eoff Elec. Co., CA 2-9411
General Elec. Supply Co., CA 7-0651
Graybar Elec. Co., CA 7-6641
Helt & O'Donnell, CA 8-0753
ROSEBURG
Industrial Elec. Service Co., OR 3-6658

PENNSYLVANIA

ALLENTOWN
Allen Elec. Co., Inc., HE 5-9515
General Elec. Supply Co., HE 3-5206
BRADFORD
Bovaird and Co., 7141
DREXEL HILL
General Elec. Supply Co., CL 9-6440
ERIE
General Elec. Supply Co., 2-1477
INDIANA
National Mines Serv. Co., 5-5655
JOHNSTOWN
General Elec. Supply Co., 7-5101
PHILADELPHIA
A. J. Lacourse, MA 7-1895
Electrical Repairs and Sale of Machinery, WA 2-2241
Jos. T. Fewkes & Co., WA 2-2241
General Elec. Supply Co., GA 6-8800
Graybar Elec. Co., WA 2-5405
PITTSBURGH
General Elec. Supply Co., FA 2-1530
Graybar Elec. Co., Inc., FA 2-4100
READING
General Elec. Supply Co., 5-8424
SCRANTON
General Elec. Supply Co., DI 4-8562
WESTCHESTER
Westchester Elec. Supply Co., OW 6-4722
WILKES-BARRE
General Elec. Supply Co., VA 2-5106

RHODE ISLAND

PAWTUCKET
New England Elec. Supply Co., 5-7400
PROVIDENCE
General Elec. Supply Co., GA 1-6523
J & H Elec. Co., GA 1-7840

SOUTH CAROLINA

ANDERSON
Woodward-Stephens Co., Inc., CA 5-2501
GREENVILLE
J. W. Vaughan Co., 2-2421
SUMTER
Sumter Machinery Co., SP 3-7321

SOUTH DAKOTA

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McLaughlin Elec. Supply House, 4911
RAPID CITY
Crescent Elec. Supply Co., FI 2-7913

TENNESSEE

CHATTANOOGA
Electric Motor Sales & Supply Co., MA 9-7361
Graybar Elec. Co., 4-3351
COLUMBIA
Middle Tenn. Armature Wks., EV 8-3672
MEMPHIS
Graybar Elec. Co., BR 8-7150
Tri-State Armature & Elec. Wks., JA 7-8414
NASHVILLE
Industrial Sales Co., Inc., AL 4-3508
Nashville Armature Wks., AL 6-2546

TEXAS

ABILENE
Graybar Elec. Co., OR 2-2861
AMARILLO
General Elec. Supply Co., DR 6-7255
Graybar Elec. Co., DR 2-6778
AUSTIN
Graybar Elec. Co., Greenwood 8-5674
BEAUMONT
General Elec. Supply Co., TE 3-6435
CORPUS CHRISTI
Bradley Motor and Armature Works, TU 2-8891
General Elec. Supply Co., TU 2-9237
DALLAS
General Elec. Supply Co., RI 2-2201
W. M. Smith Elec. Co., HA 8-4606
EL PASO
General Elec. Supply Co., 3-3407
Graybar Elec. Co., 3-7561
FORT WORTH
General Elec. Supply Co., ED 2-5385
Graybar Elec. Co., ED 5-4525
HOUSTON
Buffalo Elec. Co., CA 8-4431
General Elec. Supply Co., FA 3-3121
Graybar Elec. Co., CA 8-4571
Oliver Armature Works, CA 2-9271
LUBBOCK
General Elec. Supply Co., PO 3-8271
MIDLAND
I. W. Hynd Co., MU 4-5501
SAN ANTONIO
General Elec. Supply Co., CA 7-1261
Graybar Elec. Co., Inc., CA 7-9246
San Antonio Machine and Supply Co., CA 5-1651
United Elec. Co., Pershing 4-3141
TYLER
General Elec. Supply Co., 2-1673
VICTORIA
Electric Machine & Supply, HI 3-7604
WACO
General Elec. Supply Co., 2-1611
WICHITA FALLS
Electric Motor Co. Div., United Elec. Co., 7-8333

UTAH

SALT LAKE CITY
General Elec. Supply Co., EM 3-3911
Graybar Elec. Co., EL 9-8771
Refrigeration Distributors Corp., DA 2-5886

VIRGINIA

NORFOLK
General Elec. Supply Co., MA 2-7183
ROANOKE
General Elec. Supply Co., 3-1564
Graves Humphries Inc., 3-8011
Graybar Elec. Co., 3-3614
RICHMOND
Electrical Equip. Co., 7-2647
General Elec. Supply Co., 6-4941

WASHINGTON

SEATTLE
General Elec. Supply Co., SE 6400
Graybar Elec. Co., Inc., MU 0123
SPOKANE
General Elec. Supply Co., KE 0431
Graybar Elec. Co., Inc., EM 6611
TACOMA
General Elec. Supply Co., BR 8454

WEST VIRGINIA

BLUEFIELD
Bluefield Supply Co., DA 5-6131
CHARLESTON
Virginian Elec. Inc., 6-0631
HUNTINGTON
Virginian Elec. Inc., 2-8396
LOGAN
Logan Hardware & Supply Co., 710
WHEELING
General Elec. Supply Co., 2555

WISCONSIN

APPLETON
General Elec. Supply Co., RE 4-7155
GREEN BAY
Beemster Electric Co., HE 7-3238
Graybar Elec. Co., HE 7-3284
MADISON
Crescent Elec. Supply Co., AL 6-5441
Elec. Motor Service, AL 6-6724
MILWAUKEE
General Elec. Supply Co., BR 6-7730
Graybar Elec. Co., BR 6-8400
WAUSAU
Snapp Elec. Co., 2-1031

WYOMING

CASPER
General Elec. Supply Co., 2-7333
CHEYENNE
Frontier Elec. Supply Co., 2-6454

TERRITORY OF HAWAII

HONOLULU
American Factors Ltd., 5-1511

892-1

For more information on the new, fast-service plan—and "special" G-E Tri-Clad motors—call your local G-E motor Distributor.

SMALL A-C MOTOR AND GENERATOR DEPARTMENT

GENERAL ELECTRIC COMPANY, SCHENECTADY 5, N. Y.

GENERAL ELECTRIC

For more facts circle 506 on Reply Card

EXON 900 Series resins are tailored to your (temperatures)

...typical of the Pin-Pointed Properties in Exon vinyl resins

This unique fitting-the-resin-to-the-need is what makes Exon industry's most complete source of vinyl resins.

Take our friends, the calenderers. They produce vinyl in sheet form which demands resin properties quite different from those used in other forms of vinyl processing. Yet even having those properties is not enough. For calendering equipment varies widely in processing characteristics, particularly in temperatures.

Exon engineers created a basic resin to give calenderers the necessary properties to begin with. This resin was made to be fast blending to fuse in shorter time, to keep sheeting free of "fish-eyes," assure high quality, uniformity.

Then Exon engineers tailored this basic calendering resin to the temperature behavior of processing equipment . . . developed Exon 905, 915, 925 resins so that heat problems never again need hinder the production of any calender.

It's a typical example of Exon at work, pin-pointing properties to special needs.

Consider your problem. Then, for a resin pin-pointed to the ideal solution, call or write Firestone today.

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RESINS

CHEMICAL PROGRESS WEEK-APRIL 8-12

For complete information and technical service, call or write:

CHEMICAL SALES DIVISION

FIRESTONE PLASTICS CO., DEPT. 715E, POTTSTOWN, PA. • A DIVISION OF THE FIRESTONE TIRE & RUBBER CO.

INDUSTRY'S MOST COMPLETE LINE OF VINYLS ENGINEERED TO YOUR SPECIFIC NEEDS

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GARLOCK and Announce

THE COMPLETE INTEGRATION OF THEIR SALES FORCES

Now, the United States Gasket Company will be known as the United States Gasket Company, Plastics Division of The Garlock Packing Company.

In August 1955 Garlock acquired the United States Gasket Company. Subsequently, the production facilities of both companies were integrated. Now, it is clear that the customers of both companies will be better served through an integrated sales force.

Better Service for Customers

Both U.S.G. and Garlock customers will now enjoy the finest, most complete service available in the fields of fluorocarbons (Teflon* and Kel-F**), nylon and other plastics as well as mechanical packings and seals of all types. Specialists in specific materials and applications will always be available for consultation on your problems.

Saves You Time

This integration of sales forces will also simplify your purchasing problem . . . you can standardize on one reliable source of supply and have more time to devote to other important problems.

Unbiased Recommendations

With the addition of U.S.G. plastic products to the famous "Garlock 2,000" family of packings, gaskets, and seals, your local representative is able to supply the right seal for every conceivable need. Call him at the office nearest you.

30 Sales Offices

U.S.G. plastics specialists join the 125 Garlock salesmen at 30 sales offices and warehouses where large stocks of plastic products are stored. This means faster deliveries from local stocks, as well as expert plastics and sealing assistance as close as your telephone.

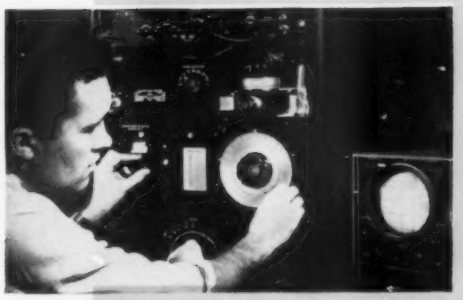
*DuPont Trademark
**M.W. Kellogg Trademark

Main Factory Buildings of The Garlock Packing Company, Palmyra, New York. Other factories in San Francisco and Canada.

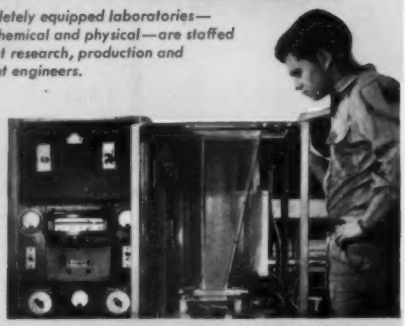
One of the two Camden, N.J. plants of the United States Gasket Company, Plastics Division of The Garlock Packing Company

United States Gasket

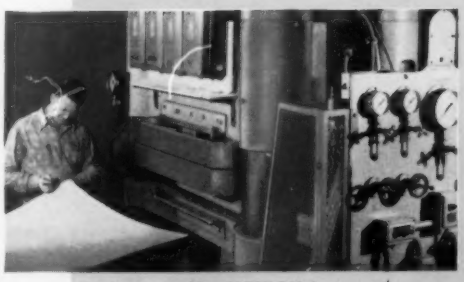
SPECIALIZED PLASTICS PRODUCTS FACILITIES AT U.S.G.



Three completely equipped laboratories—electrical, chemical and physical—are staffed by top-flight research, production and development engineers.



One of many extruders for TEFLON, KEL-F and nylon rods, tubes and special shapes.



Giant presses cold mold TEFLON sheets up to 48" x 48" in size, ready for sintering.

High product, low-cost injection molding of thermoplastic parts to manufacturers specifications.

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Buffalo 2, N.Y., *38 Pearl St.*
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Cincinnati 16, Ohio, *8329 Vine St.*
Cleveland 13, Ohio, *1276 W. Third St.*
Denver 2, Colo., *1863 Wazee St.*
Detroit 11, Mich., *2781 E. Grand Blvd.*
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New Orleans 25, La., *3525 Lowerline St.*
New York 6, N.Y., *114 Liberty St.*
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Philadelphia 2, Pa., *20 S. 15th St.*
Pittsburgh 22, Pa., *933 Penn Ave.*
Portland 9, Ore., *1036 N.W. 18th Ave.*
Salt Lake City 1, Utah, *322 Dooly Bldg.*
San Francisco 7, Calif., *750 — 18th St.*
St. Louis 8, Mo., *3635 Forest Park Blvd.*
Seattle 4, Wash., *814 Lane St.*
Spokane 4, Wash., *W. 610 Second Ave.*
Tulsa 20, Okla., *816 E. 6th St.*

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Hamilton, Ont., *200 Queen St.*
Montreal 9, Que., *5214 De La Savane St.*
Toronto 2, Ont., *750 Bay St.*
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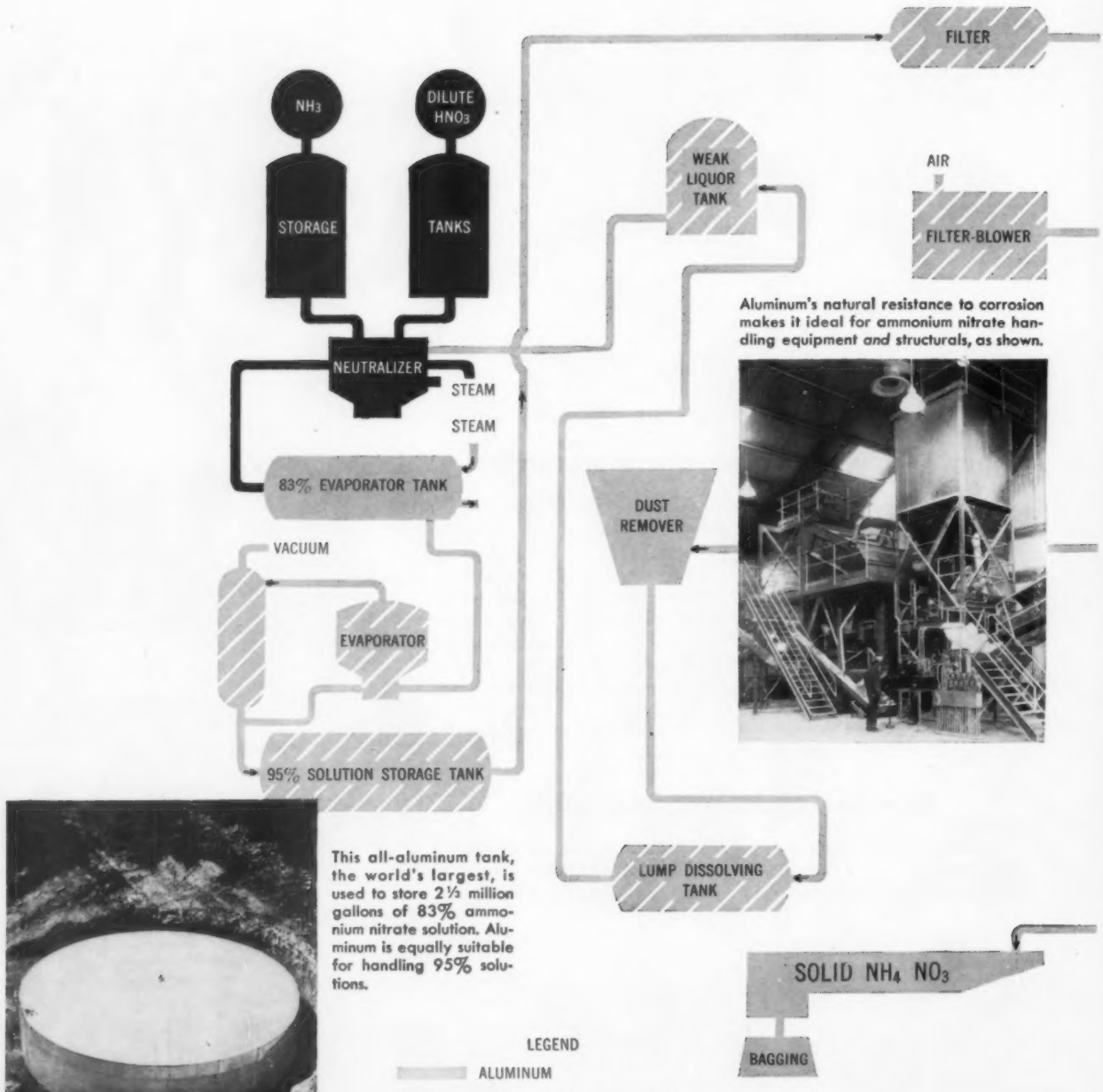
Winnipeg 3, Man., *1436 Erin St.*

GARLOCK

Packings, Gaskets, Oil Seals, Mechanical Seals, Rubber Expansion Joints, Fluorocarbon Products

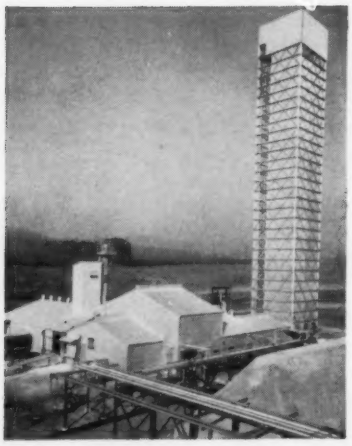
For more facts circle 508 on Reply Card

PRODUCTION OF SOLID AMMONIUM NITRATE

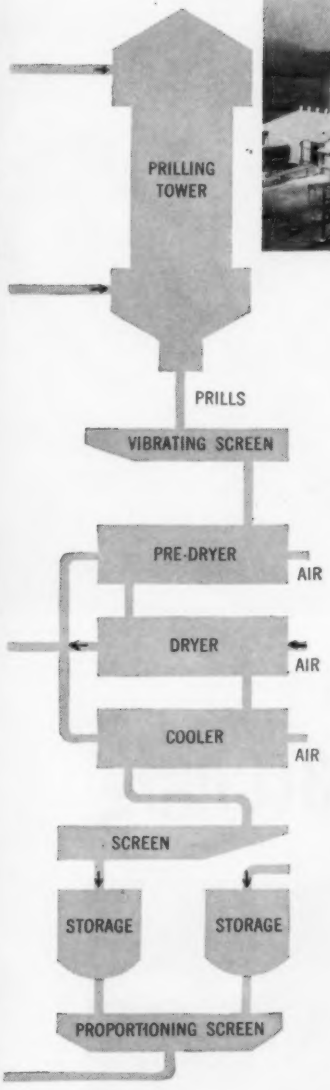


Aluminum's natural resistance to corrosion makes it ideal for ammonium nitrate handling equipment *and* structurals, as shown.

This all-aluminum tank, the world's largest, is used to store 2½ million gallons of 83% ammonium nitrate solution. Aluminum is equally suitable for handling 95% solutions.



This all-aluminum ammonium nitrate prilling tower is the tallest all-aluminum structure in the world—200 ft tall and 30 ft square. Frame, walls, piping, fittings, connections and fasteners all are aluminum to provide service uninterrupted by corrosion.



Eliminate over 50% of your corrosion trouble spots:

Specify Process Equipment of Alcoa Aluminum!

Here is a sound, low cost way to eliminate over 50% of the corrosion trouble spots in *your* process. The flow chart shows how it's done in a typical, highly corrosive operation. The answer: Specify process equipment of Alcoa® Aluminum.

Many liquids and gases normally corrosive to most metals will not corrode aluminum. It resists, successfully, attack by process materials *as well as* the corrosive atmospheres which often surround equipment. And aluminum also offers you this unique combination of highly desirable benefits: low cost . . . light weight . . . good workability . . . high thermal conductivity . . . excellent strength in alloys . . . nonmagnetic, nonsparking characteristics . . . nontoxicity . . . and excellent reflectivity.

Consider, too, *this* important fact about aluminum: no one has had more experience with the light, corrosion-resistant metal than Alcoa—the aluminum pioneer. Alcoa engineers have worked with aluminum in the process industries for over 30 years. Their accumulated knowledge of corrosion problems is yours for the asking.

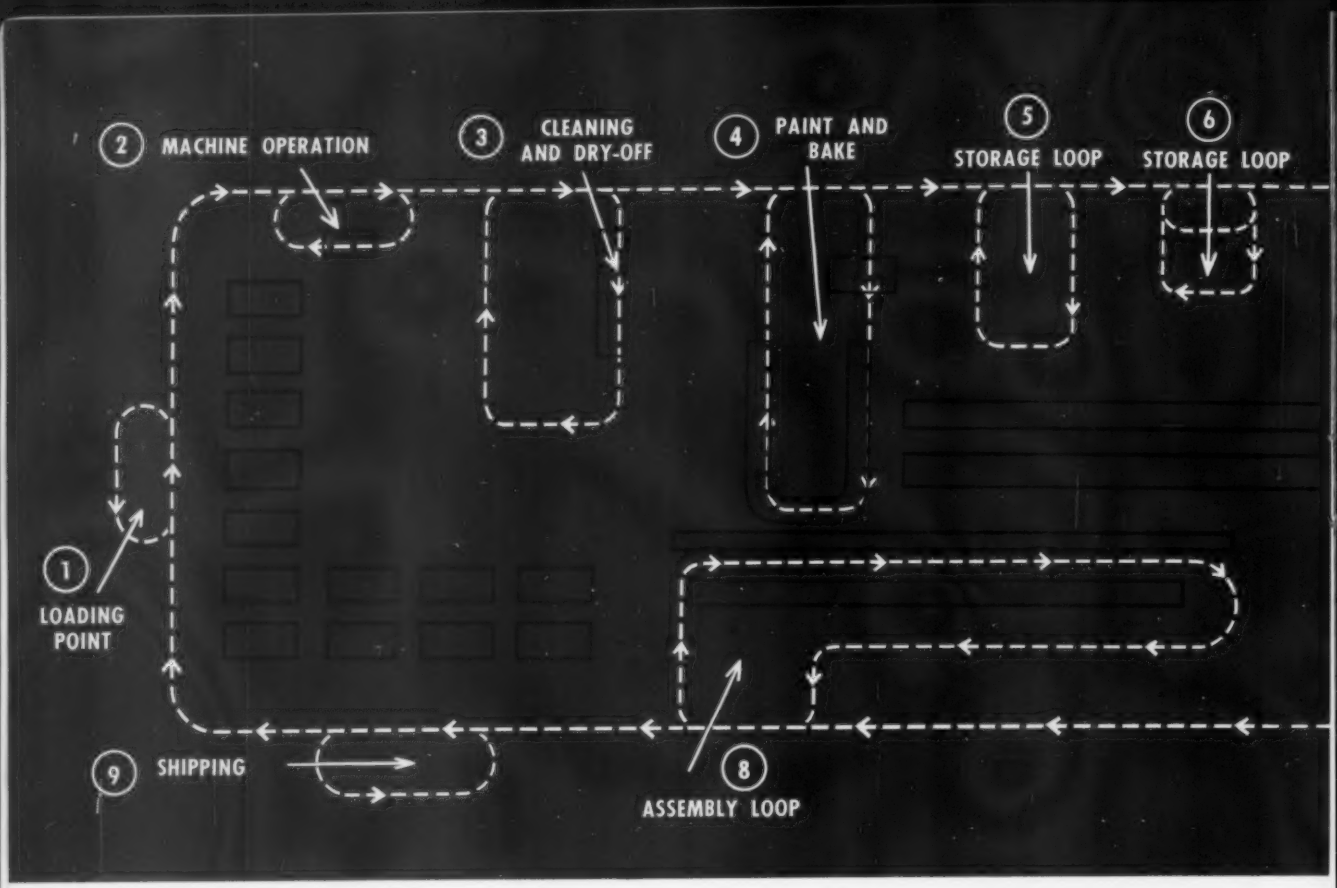
Find out how *you* can free yourself of many of your corrosion headaches . . by specifying process equipment of Alcoa Aluminum. Tell your nearest Alcoa representative about your corrosion problems —or write Aluminum Company of America, 889-C Alcoa Building, Pittsburgh 19, Pennsylvania.

THE ALCOA HOUR
TELEVISION'S FINEST LIVE DRAMA
ALTERNATE SUNDAY EVENINGS

ALCOA ALUMINUM
ALUMINUM COMPANY OF AMERICA

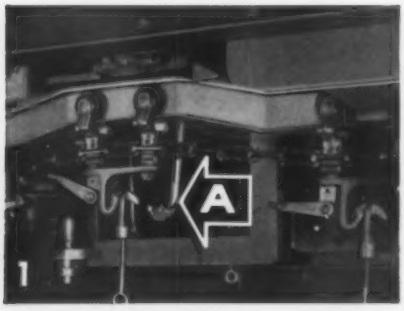
THIS FREE BOOK can be your guide to corrosion-free process equipment. Its 80 pages are packed with information on the behavior of aluminum in the process industries. Write today for *Process Industries Applications of Alcoa Aluminum.*

For more facts circle 509 on Reply Card



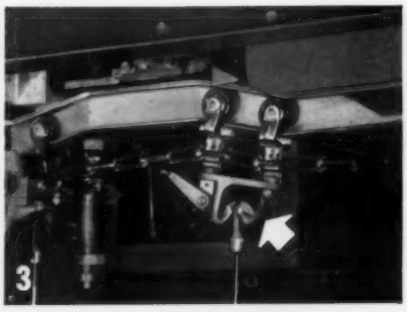
with new Trans-Free conveyor by Allied

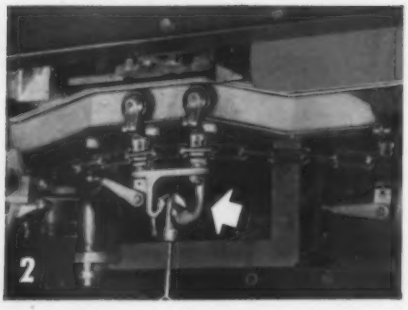
Completely Automatic Dispatching



1 Automatically dispatched for transfer from live line to free, the load bar rises on live track to free line level, mechanically triggers transfer hook A on free line swinging it forward toward interception position.

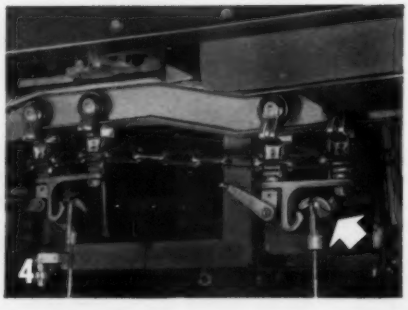
2 Perfect synchronization assures coordination of the two lines, transfer hook here engages load hook. Transfer of load is now ready to be completed mechanically without use of air cylinders, solenoid switches, etc.





3 As live line rail begins dip to original position, load hook and transfer hook are both firmly engaged giving positive load control throughout transfer. Incoming, outgoing loads are controlled to prevent collision.

4 Load hook dips below level of transfer hook leaving load on the free line hook to go to intermediate operations or storage. Free line may be powered, load returned to live line at some other point, if desired.



1. Loading Point—raw stock loaded on Trans-Free at receiving department or stores.
2. Machining or other Fabrication Operation—may be first of several—hoist permits small parts containers to be raised or lowered from Trans-Free at will.
3. Cleaning and Dry-Off.
4. Paint and Bake—baking cycle may be varied.
5. Storage Loop—selectively stores intermixed parts automatically and recalls individual parts as required by schedule.
6. Storage Loop—same as (5) except individual parts are manually positioned for dispatching.
7. Assembly Loop—selects parts for assembly area automatically. May be first of several—may return processed parts to main line at "A" or "B" as schedule requires.
8. Assembly Loop—automatically selects parts. Returns to main line upon completion of operation. Loop size and shape may be varied.
9. Shipping Loop—selects all completed parts on main line.

and Product Handling from loading point to shipping dock

Trans-Free is mechanical. There's nothing electrical, nothing hydraulic. No switches, no belts, no "down-hill" transfer points. So complicated maintenance problems are virtually eliminated.

Trans-Free is automatically dispatched. You can unload to, from, and at any pre-selected combination of stations. Your load timing, transfer, circulating storage and load control through transfer points—all are automatic.

Loaded carriers leaving any work station are sent automatically to the next designated one. So, you handle many different parts at once, unloading at any station desired. As carriers are emptied they return to the loading area.

Trans-Free is economical. It uses standard track and trolley. So you can integrate Trans-Free with existing facilities saving on your initial investment. With Trans-Free you have truly automatic handling, a system that gives you: lowered labor costs; integrated conversion; and—very important—completely mechanical operation, a big maintenance saving.

Let us send you the complete story on Trans-Free. Simply write to Allied Conveyors (see address below). Or, next time you are in Detroit see the unique Trans-Free conveyor system in actual operation. The phone number is TWinbrook 2-3040.

7th NATIONAL MATERIALS HANDLING EXPOSITION
Convention Hall, Philadelphia, April 29 to May 3, 1957, BOOTH No. 930

ALLIED CONVEYORS

ALLIED STEEL AND CONVEYORS • DIVISION OF THE SPARKS-WITHINGTON CO.

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HOW TO PUT HALLOWELL SHOP DESKS TO WORK IN YOUR PLANT

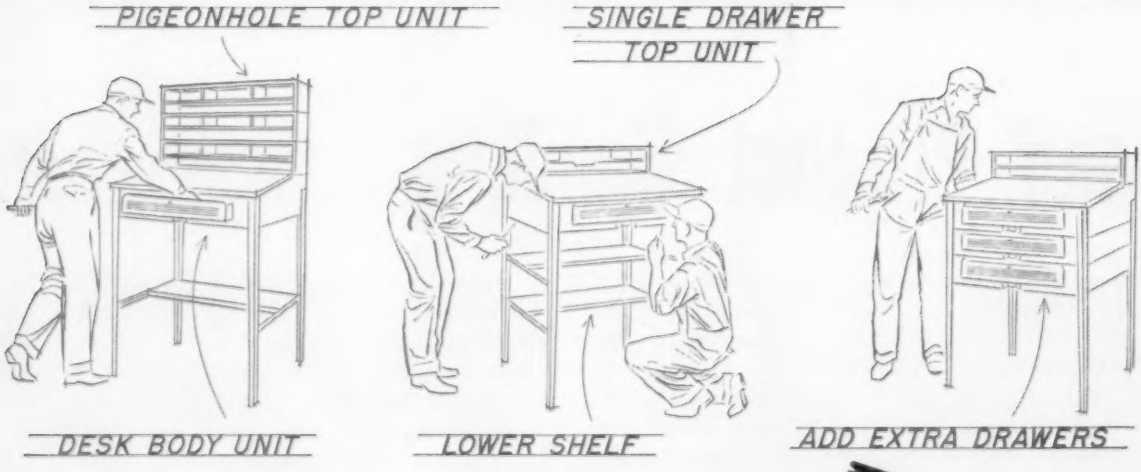
BUY THESE STANDARD MODELS

MODEL 406

MODEL 409

MODEL 400

OR USE INTERCHANGEABLE PARTS TO CUSTOM BUILD THESE DESKS



Sturdy steel for years of use · Large, smooth writing surface · Drawers that glide on roller bearings, have recessed drawer pulls · Built-in lock · Green baked-on enamel finish · Stocked by leading shop equipment dealers · Ask for Bulletin 2106 · Hallowell Shop Equipment Division, Standard Pressed Steel Co., Jenkintown 26, Pa.

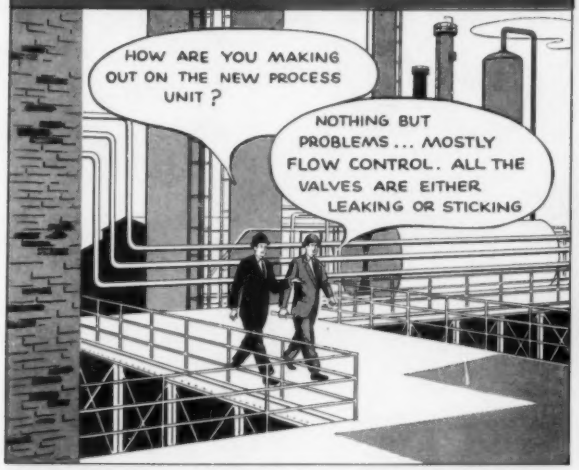
HALLOWELL SHOP EQUIPMENT DIVISION
STANDARD PRESSED STEEL CO.
SPS
JENKINTOWN PENNSYLVANIA

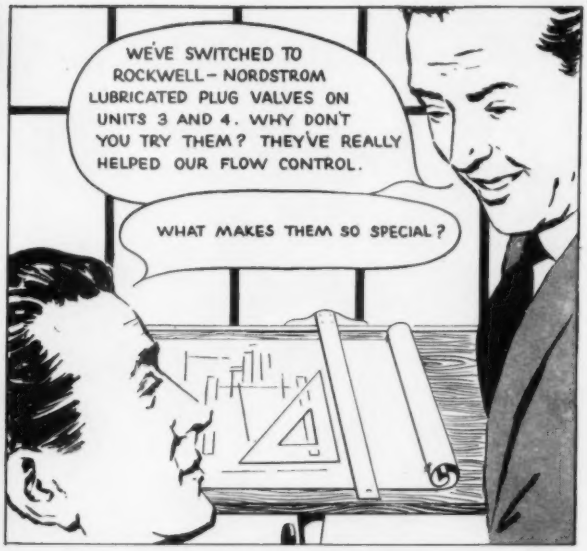
BENCHES (CABINET, WORK, UNIT) • STOOLS AND CHAIRS • SHOP DESKS • TOOL STANDS AND CABINETS • DRAWERS, DRAWER TIERS • STEEL CARTS • SHELVING

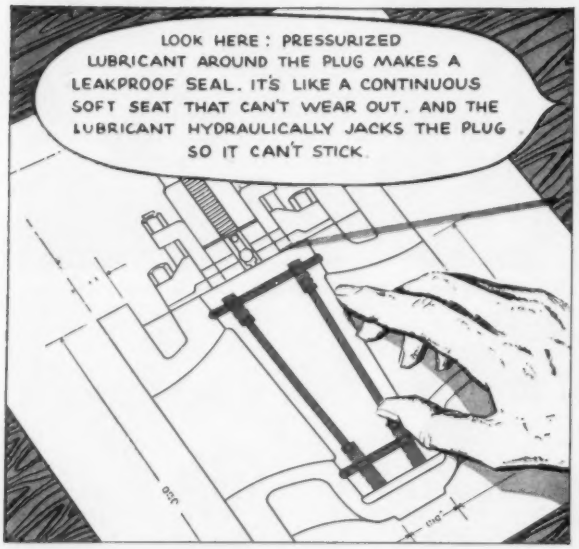
For more facts circle 511 on Reply Card

COST CUTTING IN ACTION

by Rockwell-Nordstrom


HOW ARE YOU MAKING OUT ON THE NEW PROCESS UNIT ?
NOTHING BUT PROBLEMS ... MOSTLY FLOW CONTROL. ALL THE VALVES ARE EITHER LEAKING OR STICKING


WE'VE SWITCHED TO ROCKWELL-NORDSTROM LUBRICATED PLUG VALVES ON UNITS 3 AND 4. WHY DON'T YOU TRY THEM? THEY'VE REALLY HELPED OUR FLOW CONTROL.
WHAT MAKES THEM SO SPECIAL ?


LOOK HERE : PRESSURIZED LUBRICANT AROUND THE PLUG MAKES A LEAKPROOF SEAL. IT'S LIKE A CONTINUOUS SOFT SEAT THAT CAN'T WEAR OUT. AND THE LUBRICANT HYDRAULICALLY JACKS THE PLUG SO IT CAN'T STICK.

WHAT ABOUT COST AND MAINTENANCE ?
THEY DON'T COST ANY MORE TO BUY THAN ORDINARY VALVES. THEY COST LESS TO USE BECAUSE LUBRICANT STOPS METAL-TO-METAL WEARING FRICTION.

WELL, IF THEY'RE SO GOOD, WHY DON'T WE USE ROCKWELL-NORDSTROM VALVES IN MORE PLACES ?
WE PROBABLY WILL. I'VE HAD THEM ON TEST FOR A GOOD WHILE AND THE OPERATIONS AND COST REPORTS HAVE ME CONVINCED.

ROCKWELL-
Nordstrom
VALVES

LUBRICANT SEALED FOR POSITIVE SHUT-OFF

Rockwell-Nordstrom valves are available in a complete range of sizes and ratings in semi-steel, steel, stainless steel and other corrosion resisting metals.

Send Coupon For Free Literature

Rockwell Manufacturing Company
Rockwell-Nordstrom Valve Division
Department CS-1, Pittsburgh 8, Pa.

☐ Please send me complete information on Rockwell-Nordstrom valves for process, industrial and manufacturing flow control.

☐ Please send me the name of your nearest distributor . . . ask him (to) (not to) call immediately.

Name_____ Title_____

Firm_____

Street_____

City_____ Zone_____ State_____

For more facts circle 512 on Reply Card

Typical plant ceiling showing foil-faced Pittsburgh Fiber Glass insulation in position.

"Pittsburgh Superfine is easiest to apply... most efficient insulation for steel buildings"

SAYS MR. CHARLES W. JACKSON, *President of Quonco, Inc., fabricated steel building sales and erection firm of Indianapolis, Ind.*

Experience has taught Quonco, Inc., that it takes more than conventional material to properly insulate a fabricated steel building. First of all, the material must be self-supporting and preferably blanket-type. It must be lightweight and very easy to handle. Further, it must be extremely efficient in insulating against heat loss and absorbing noise.

Quonco found all of these insulation advantages in one product—Pittsburgh Superfine Fiber Glass. Mr. Jackson, President of the Indianapolis firm, sums up the advantages this way: "Since Pittsburgh Superfine in our buildings reduces heat loss to only ⅓ that of conventional masonry buildings, our customers can plan for a lower initial investment in heating equipment and cut their estimated fuel costs considerably." As an example, Mr. Jackson cites the case of the world's largest fabricated steel building—7½ acres—in which 300,000 sq. ft. of Pittsburgh Superfine was used. Only one of the plant's three boilers, and 7 of the plant's 12 air supply units is needed to maintain a comfortable 75° for over 3000 employees. Even during hot summer months, temperatures are 10° to 15° cooler inside without air conditioning.

If plant and office modernization or construction is part of your current plans, be sure to know about the unusual features and savings that Pittsburgh Superfine insulation can provide you. For your copy of Bulletins F-100 and F-140, write Fiber Glass Division, Pittsburgh Plate Glass Company, One Gateway Center, Pittsburgh 22, Pa. For immediate service on your specific problem, you can call the nearest Fiber Glass Division sales office listed below.

PITTSBURGH SUPERFINE FIBER GLASS IS A PRODUCT OF THE FIBER GLASS DIVISION OF PITTSBURGH PLATE GLASS COMPANY

Sales Offices are located in the following cities: Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, New York, Philadelphia, and St. Louis

FIBER PPG GLASS

PAINTS • GLASS • CHEMICALS • BRUSHES • PLASTICS

PITTSBURGH PLATE GLASS COMPANY

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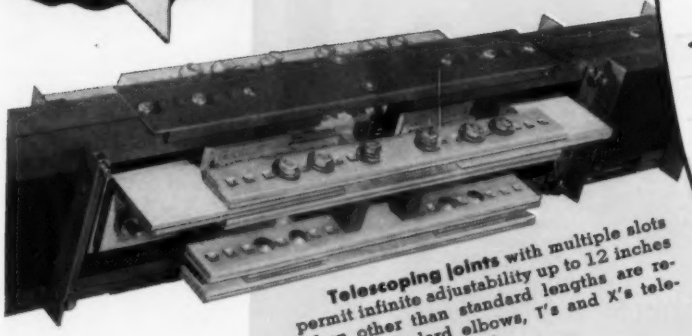
Here's Why Square D's New Adjustable

ALUMINUM FEED-IN DUCT

makes a lot of sense to me!

Needed-Rush!
85 feet; 3½ inches
1000 Amp, 3ϕ4 wire
Feed-in Duct



Telescoping joints with multiple slots permit infinite adjustability up to 12 inches when other than standard lengths are required. Standard elbows, T's and X's telescope up to 6 inches!

Fast delivery because any length requirement can be met with standard 3, 5, 7, or 10 foot lengths, plus telescoping joints

Faster to Install • Above photo of fixed joint shows simplicity of design—symmetrical ends—less bars per phase—fewer connections—outward-facing captive bolts

Completely adjustable after it's hung. For example, if two ends terminate 6½ inches apart, connection can still be made with a telescoping joint

Totally enclosed for safety —at no price premium. No de-rating necessary. Square D's design eliminates need for ventilation

MORE DESIGN FEATURES

- Thinnest cross-section available! Tight spots, pipes and structural members present less problems
- Easy transposition of phases, using standard telescoping joint parts, for maintaining balanced voltage on long runs
- Certified short circuit tests by an independent testing laboratory have proved the superiority of Square D's continuously-supported bus design

Write for the complete story
Address Square D Company, 6060 Rivard Street, Department SA, Detroit 11, Michigan

NOW...EC&M PRODUCTS ARE A PART OF THE SQUARE D LINE

SQUARE D COMPANY

For more facts circle 514 on Reply Card

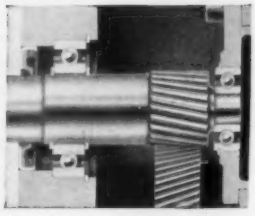
EFFICIENT NEW RUNNING MATE

for latest NEMA motor sizes...

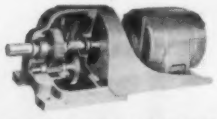
LINK-BELT Motogear designed for bracket-mounting foot-type motors of any manufacturer

EASY MOTOR REPLACEMENT—Remove four mounting bolts and separate coupling. Oil drainage is unnecessary. Sturdy bracket design aids motor re-alignment.

ABILITY TO ACCOMMODATE A WIDE RANGE OF MOTORS meets emergencies, minimizes downtime.



RIGIDITY of high-speed shaft and pinion is provided by straddle-mounting — extremely important in coping with shock, reversing or heavy loads.



ONE LOW-SPEED GEAR SET per drive size and maximum accessibility of all operating parts simplify inspection, maintenance and ratio changes.

Immediately available from stocks near you—new Link-Belt Motogears in sizes up to 60 hp, output speeds from 280 down to 6 rpm.

Wherever space is restricted . . . where downtime means a costly break in production continuity—Link-Belt Motogears soon pay their own way. In addition to easy motor replacement—simplified ratio changes and quick accessibility of parts for maintenance offer major service savings.

Contact your nearby Link-Belt office or authorized stock-carrying distributor for facts. Ask, too, about the new flange-mounted Gearmotors stocked in sizes up to 30 hp. Or write for Book 2447, giving details of both.

LINK-BELT

ENCLOSED DRIVES

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville (Sydney), N.S.W.; South Africa, Springs. Representatives Throughout the World. 14,318

For more facts circle 515 on Reply Card

BULLETINS just released and of immediate plant interest

On pages 257-258 are two postage-free Reader Service Cards provided for your convenience in ordering these bulletins. You may also use the cards to order any literature mentioned in ads.

ELECTRICAL

101 **Motor Selection**—Twelve-pp Application Guide 102 makes it easy to choose electric motors for many common applications. You select from tables, the kind of equipment or machinery to be driven—then identify character of the load, speed of operation, starting and running torques, surrounding atmosphere, frame type and speed to arrive at right motor for application. Dimensions and other pertinent data are provided. Line covered includes 1/20 to 400 hp motors, polyphase, single phase, d-c types. Century Electric Co.

102 **Load, Frequency Control**—Bulletin B91-1, 24 pp, describes all-electronic load and frequency control systems for captive plant, small utilities, and multiple station systems. Although each control system is custom-planned, this bulletin describes individual servos that form an interlocking, continuous chain for the cumulative control of all factors, from ties to generators. Included are electrical servo-mechanisms for area requirement computer, control circuit, positive governor adjustments, others. Minneapolis-Honeywell Regulator Co.

103 **Indoor Power Center**—Bulletin CS-1010 introduces a line of indoor power center transformers for 300 kva and below, completely self-contained units which are ideal for lighting circuits, small industry and commercial buildings. Engineering data, weight, dimensions and detailed schematic drawings of units included. Kuhlman Electric Co.

104 **Unit Substation Transformers**—Bulletin 9004-B, 10-pp, contains information on unit substation transformers. Details of construction are illustrated and described and photos and cutaway views are included. Primary devices are also covered. I-T-E Circuit Breaker Co.

105 **Current-Limiting Reactors**—Design and application data on current-limiting reactors are available n 16-pp Bulletin GEA-976D. Describes line of RM (repetitive manufacture) cast-in-concrete reactors for circuits of 34.5 kv and below. Ratings, dimensions and weights are given for reactors designed to fulfill all normal requirements in the 5- and 15-kv classes. One-line circuit diagrams show locations where reactors can economically provide overcurrent protection needed in system expansion. General Electric Co.

106 **AVA Cable Manual**—Bulletin RMI 9-55 is a 30-pp manual on AVA cables—cables insulated with impregnated asbestos and varnished cable tape. Covers application and design data for three-conductor armored cables and single-conductor cable in conduit. Comparisons are tabulated to cover circuit length, capacity and regulation, economic and physical factors. A section is devoted to component parts. Engineering data on insulated cables is included to aid in calculating sizes and circuit data on common types of wire used in 600 v distribution systems. Rockbestos Products Corp.

107 **Electronic Wire** — Publication 19-586 describes high-temperature electronic wire for internal wiring of electrical and electronic equipment, meters, and panels, and available with thermoplastic, nylon, and silicone insulation. Complete specifications and application data are given. General Electric Co.

108 **Electrical Connectors**—This connector reference file features data on electrical connectors in readily usable form. Each sheet in the series is devoted to a connector type used in power transmission or distribution. Illustrated with photos and drawings, it includes brief descriptions of connector applications and design features. Burndy Corp.

109 **Electrical Boxes**—Catalog 10, 24 pp, features descriptive information on a line of electrical boxes and cabinets, including junction boxes and pull boxes, conduit boxes, hinged cabinets, explosion housings, and fixture outlet boxes. Cutaway drawings are included, in addition to a section devoted to specifications and requirements of electrical enclosures. Spring City Electrical Mfg. Co.

110 **Autotransformers**—This 24-pp bulletin describes the complete line of Variac adjustable autotransformers. Dimension drawings, in addition to photos, are included for all models, and complete specifications and prices are tabulated. Information on special designs is also furnished. General Radio Co.

MECHANICAL POWER TRANSMISSION

111 **Variable Pitch Drives**—Catalog V-183-A, 12 pp, features a line of wide range variable pitch sheaves, companion sheaves, and belts. Cutaway views showing component features are included, as well as dimensional diagrams, specifications, engineering information and tables of practical stock drive combinations. Browning Mfg. Co.

112 **Magnet Brake**—Bulletin GEA-6214, 8 pp, describes outstanding features of a d-c magnet brake, explains simplified installation and maintenance procedures, provides cutaway drawing that pinpoints brake's operating features. It also describes wide variety of applications, and provides diagrams and tables that show how the brake meets AISE standards in 8, 10, 13, 16, 19, and 23-in. wheel sizes. General Electric Co.

113 **Cylindrical Roller Bearings**—Multi-Row cylindrical roll neck bearings are described in 24-pp Form 436. Contains complete engineering and technical data on cylindrical roller bearings designed for heavy-duty service in roll neck mountings on hot and cold rolling mills. Typical installations are illustrated, and mounting and dismounting, assembly, capacities, lubrication, inspection, sizes and dimensions, and engineering data covered. SKF Industries, Inc.

114 **Improved Flat Belt**—A new concept in belt drives, the Tanastic, is described in this 8-pp brochure. Tells how this reinforced flat belt combines the grip of leather with the strength of plastic. Provides design and application information on the belt, and includes selection data. J. E. Rhoads & Sons.

INSTRUMENTS, CONTROLS

115 **Guide to Automatic Controls**—Described in 56-pp Catalog 857 on automatic controls are some 100 items, all featuring hermetically sealed mercury contacts. Catalog lists controls for single-stage pressure, two-stage pressure, differential pressure, single-stage temperature, two-stage temperature, liquid level and mechanical movement. Also shown are relays and mercury switches. Each control, with accompanying description, specifications and engineering data can be located by a dual index. The Mercoid Corp.

116 **Panel Instruments** — Bulletin 2057, 5 pp, contains descriptions and specifications of company's stock panel instruments. Illustrated with photos of meter styles and various movements available, it also contains dimensional drawings for meter mounting. Typical meter scales are reproduced in actual size. Simpson Electric Co.

117 **Pneumatic Transmission System**—Bulletin 750, 8 pp, describes the Laminair, a form of pneumatic transmission developed to provide a sensitive and accurate type of instrumentation. Advantages are listed and cutaway view showing component parts is included. Suggested specifications are also given. Simplex Valve and Meter Co.

118 **Thermal Conductivity Analyzers**—Bulletin TD-507, 16 pp, contains information on the practical application and operation of thermal conductivity analyzers. Complete with photos, drawings, and diagrams, it offers valuable information on continuous gas analysis instruments. Thermal conductivities of gases are tabulated and calibration curve for air-H_2 mixture included. Arnold O. Beckman, Inc.

119 **Chlorine Gas Feeders** — Simplicity of operation of company's chlorine gas feeders is described in Bulletin 840-N10, covering visible flow indicator, visible vacuum pyrex bell jar and positive-control chlorine diaphragm valve. Four types of control are diagrammed, and construction features, operation and application advantages, safety features, dimensions and control variations discussed. Builders-Providence, Inc.

120 **Conversion Chart** — Tables of Fahrenheit and Centigrade temperature equivalents are presented in this handy temperature conversion chart. Its reverse side illustrates, by means of animated demonstration, the easy reading qualities of company's thermometers with glass red reading column. Moeller Instrument Co.

PUMPS, COMPRESSORS

122 **Industrial Pumps**—An easy-to-use table for determining horsepower, capacity and head for vertical pumps is included in 12-pp Bulletin 1100. Also contains sectional views, material specifications, schematic application drawings, and photos of installations. Important pump features illustrated. Layne & Bowler Pump Co.

123 **Pump Units**—Catalog 107, 8 pp, contains information on Type-SU pump units, designed principally for handling heavy fuel oils in industrial and commercial oil burner service, as well as for the movement of any non-corrosive, highly viscous liquid with lubricating qualities. Charts and diagrams give complete dimensions, operating characteristics and pump and motor performance data. Tuthill Pump Co.

124 **Internal Gear Pumps**—Condensed data on five new series of internal gear rotary pumps are provided in this illustrated folder. Pumps cover broad service range. Wayne Pump Co.

125 **Air Cooled Compressors**—Bulletin AC-15, 16 pp, shows a complete line of small, air-cooled compressors for industrial, and other use. Both one- and two-stage compressors are covered, with working pressures ranging from 85 to 175 psi. Complete specifications for each model are given and two charts—one for figuring compressor needs and another showing estimated air consumption for 30 common shop jobs—are printed. Gardner-Denver Co.

VENTILATING AND DUST CONTROL

126 **Roof Ventilators**—Bulletin 3904, 8 pp, describes company's redesigned line of power roof ventilators. Construction, operation and design features of each of the four models in the line are described and performance data tabulated. Included are fan speeds and motor horsepower as well as certified delivery ratings up to ½-in. w.g. static pressure, installation drawings, dimensions. American Blower Corp.

127 **Got a Dust Problem?**—A collection of product sheets providing application suggestions and specifications on Dustkop equipment designed to solve a wide range of dust handling problems is provided in Bulletin 700. Various models are pictured and typical installations illustrated. Also included are price data and information on accessories for installation of dust and mist control systems. Aget Mfg. Co.

CONSTRUCTION AND MAINTENANCE

129 **For Big Buildings**—Six-pp Bulletin SX-14156 describes truss-type steel buildings for large structural requirements, covering clear-

BULLETINS

(Begins on page 21)

span widths to 100 ft with areas from 4800 sq ft. Dimensions and specifications are given and drawings illustrate how buildings are erected. Typical installations are shown. Armco Drainage & Metal Products, Inc.

130 Partitions and Walls—Low cost sound-absorbing partitions and walls designed for movable and flexible office enclosures are featured in this illustrated bulletin. Dimensional diagrams and specifications are included, as well as photos of typical installations. GR Products Inc.

131 Wire Partitions—The modern, economical approach to plant layout problems is described and illustrated in 8-pp Bulletin P-55 on wire partitions and custom enclosures. Describes important design and construction features, and includes specification data and dimensional diagrams. Wire and Iron Products Inc.

132 On Sidewall Panels—Eight-pp Catalog C-100-A covers Tectum sidewall panels for industrial sound control. Describes structural strength, insulating qualities, fire resistance, other features of the material—a mat of wood fibers impregnated with hydraulic cement binder and compressed to a variety of thicknesses. Discusses simplified erection, shows fastening details, and includes specifications, design details. Tectum Corp.

133 Ceiling Air Diffusers—Bulletin 390-F-57, 8 pp, describes company's line of low-velocity, ceiling air diffusers. Gives engineering data and diffuser selection data on the Multi-Vent troffer, a combination ceiling air diffuser and fluorescent troffer light, as well as data on standard modular diffuser, linear diffuser, and unitary diffuser for flush mounting in every type of ceiling. Multi-Vent Div., The Pyle-National Co.

134 Automatic Doors—This company's automatic door equipment is described in two new catalogs. An 8-pp one refers to the Prest-O-Matic electric industrial door units and fire door operators. It describes various models available and includes illustrations and suggested specifications. A 4-pp catalog covers Prest-O-Matic cold storage floor assemblies. Clark Door Co. Inc.

135 Roof and Floor Systems—All related specifications, data and detailed drawings for roof and floor systems, curtain wall back-up, and other building sections are featured in this 80-pp design manual. Loose-leaf bound, it is designed to save design and specification time on every job using perlite insulating concrete and/or perlite-gypsum plaster. There is a minimum need for cross-reference, since all data and specifications for each system or building component are complete in separate detachable units. Charts and tables give U factors, dead loads and load carrying capacity data for many types of constructions. Perspective drawings are included, as well as descriptions of features, advantages, and limitations. Physical characteristics are also detailed. Available to qualified plant engineers. Perlite Institute.

136 For Maintenance, Construction—A variety of materials for industrial maintenance and construction are described in this 20-pp catalog, including brickwork caulking, masonry dampproofing, rubber expansion joint materials, masonry exteriors, concrete mixtures, colorful concrete floors, and concrete coatings. Descriptions of the products, as well as uses, specifications and application information included. A. C. Horn Companies, Div. Sun Chemical Corp.

137 Tough Floor Topping—Chemi-Top, a corrosion resistant floor topping for food processing, chemical and other plants having severe floor corrosion problems, is discussed in 8-pp Form A515R. What Chemi-Top is, and what it can do, are explained. Two basic formulations and three service types are covered, also a non-skid type for maximum slip resistance. A chemical resistance chart is included. Bulletin also lists surface cleaning preparations. The Garland Co.

138 Acid-Proof Cements, Primers—Bulletins 101-105 comprise a series on company's line of acid-proof cements and primers. Properties and characteristics of each type are detailed, specifications and uses are listed, and method of preparation described. Nukem Products Corp.

139 Scaffolds and Ladders—Catalog A, 24 pp, describes company's line of scaffolds and ladders for construction, concrete shoring, plant maintenance and building repairs. Typical installations are pictured, major components illustrated, and erection procedure described. Complete technical data are also included. Chesebro-Whitman Co. Inc.

140 Efficient Steam Cleaner—Form 17-A-56 features Series 4000 Hypressure Jenny which offers cleaning pressures to 450 lb and temperatures to 325 F. Choice of cleaning action, nozzle control system, and other features are discussed. Six models in the series are detailed and three are illustrated. Hypressure Jenny Div., Homestead Valve Mfg. Co.

CHAINS

141 Flat-Top Conveyor Chain—Bulletin 56-60, 26 pp, pictures and describes both steel and nylon table-top conveyor chains for level, smooth movement of materials. Engineering and application data are included, as well as information on conveyor design. Bulletin is illustrated with photos, drawings and diagrams showing important features of design and operation, together with pictures of typical installations. Chain Belt Co.

142 Bushed Roller Chain—Book 2454, 16 pp, contains a complete presentation of features of company's LXS roller chain, along with application and selection information. Chains for power transmission and for conveyors and elevators, as well as attachments for the latter are covered. Dimensions, weights, strengths and other data are included. Link-Belt Co.

MATERIALS HANDLING

143 Hand Hoists—Catalog 1372, 46 pp, describes company's line of hand hoists, Pul-Lifts and trolleys. How to select proper type of hoisting equipment is detailed, and hand hoist specifications and dimensions are included, along with other technical data. Every type and modification of hand chain hoists is covered and complete engineering details included. Photos, drawings, and dimensional diagrams amplify text. The Yale & Towne Mfg. Co.

144 Oscillating Conveyors—Book 2644, 8 pp, describes design and operation advantages of company's oscillating conveyors which combine positive action and natural frequency principles. Capacity charts, dimensional diagrams, and selection data included. Link-Belt Co.

145 Tranfer Machines—Bulletin 401 describes this company's revised and expanded line of standard Trans-O-Mator straight line transfer machines for automatic assembly, and discusses advantages of standard machines over special designs. Typical applications and design features are shown and dimensions of bases with 6- to 24-in. strokes given. Ferguson Machine Corp.

146 Screw Conveyor Components—Six-pp Folder 2489 describes related ball bearing equipment being added to company's screw conveyor component line. Low starting friction and free-rolling action of these ball bearing components are discussed. Technical data on selection and application of Quik-Link conveyor screws, trough ends and hangers are provided, as are "get over and around" examples of how drive-end space problems can be solved. Link-Belt Co.

147 Automatic Ramp—Power-operated, automatic-leveling dock ramps for either air-oil (air compressor) or electric operation are described in this 6-pp bulletin. Design and construction features are illustrated, and specifications are included. Globe Hoist Co.

You'll save time in ordering Bulletins by using the Reader Service Cards provided on pages 257-258. Of course, we honor letterhead requests—but it takes us a bit longer to handle them.

148 Motor Scraper—Design, engineering, construction and operating features of company's motor scraper for large projects are described in Catalog MS-1104. Augmenting text matter are pictures and illustrations that help clarify design and operation. Specifications are also included. Allis-Chalmers Mfg. Co.

HEAT EXCHANGING, COOLING

149 Heat Exchange Equipment—Bulletin HE-1 specifically describes shell and tube heat exchange equipment. Construction features, general specifications and standard materials for the line of heat exchange equipment are outlined in tabular form for ease of reference. Heat Transfer Co.

150 Cooling Towers—Advantages offered by company's cooling towers for air conditioning and industrial service are described in 16-pp Bulletin 5.1.902. Structural and mechanical features are detailed, typical cross sections are diagrammed, and engineering data, dimensions and arrangements shown. Specifications and typical installations are also given. J. F. Pritchard & Co.

VALVES, PIPING, FITTINGS

152 Bronze Valves—Bulletin DH-25 describes solder end and silver-braze end bronze valves in gate, globe and check designs. Also included are physical characteristics and construction details. R-P&C Valve. Div., American Chain & Cable Co., Inc.

153 Air Valves—Catalog V-103, 8 pp, introduces three new models to company's line of ¼-, ⅜- and ½-in. air valves. These four-way valves are available as single solenoid, or for foot or cam operations. Features of these valves are listed and dimensional drawings included. Catalog also shows other models of air valves and includes price list. The A. K. Allen Co.

154 Adapter Fittings—Twelve-pp Catalog 4360 shows straight thread plugs and adapters, O-rings for straight thread fittings, and steel and brass pipe fittings. Specifications are tabulated, and photos and drawings showing component features included. Tube & Hose Fittings Div., The Parker Appliance Co.

155 Steel Tubing, Fittings—Bulletin V-157 describes steel tubing and fittings for vacuum systems and conveying lines. Specifications are included, as well as data on performance, capacity, and installation methods. Photos of typical installations and numerous diagrams showing details of construction and design are furnished. H-P Products, Inc.

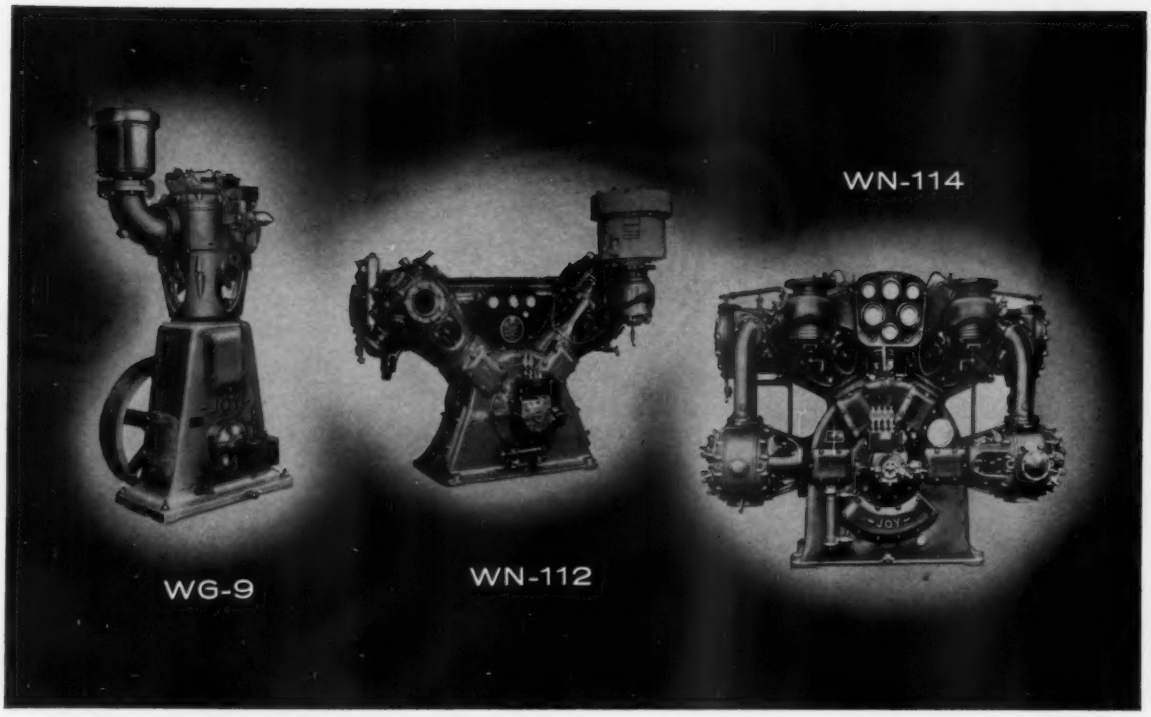
156 Flared Tube Fittings—Catalog 4310, 52 pp, presents company's Triple-lok tube fittings, made in brass, steel, stainless steel, and aluminum, in a variety of shapes including new swivel nut type and straight threaded fittings with O-rings for new SAE straight thread boss. Fully illustrated with photos and dimensional drawings, catalog discusses general features and includes pertinent engineering data. The Parker Appliance Co.

157 Underground Pipe Conduit—Bulletin 9156, 12 pp, covers essentials pertaining to underground pipe conduit. Construction and installation of the conduit are detailed and results of strength tests and complete specifications are included, as well as photos of typical installations, dimensions, and design suggestions. Porter-Hayden Companies.

WATER CONDITIONING

158 Water Plant Automation—Technical Reprint T-148, a 10-pp article, tells how automation is finding wide application in boiler feedwater and process water treatment fields. Case histories are presented pointing out problems involved, methods of solution, and showing flow diagrams. Classification breakdowns of processes and equipment into three groups—mechanical, chemical and ion exchange—are included. Types of measurements required by the processes and types of control are classified, and various demineralizers available are indicated. Graver Water Conditioning Co.

(More Bulletins on page 259)



NEED TO *Expand* YOUR COMPRESSED AIR FACILITIES?

WRITE FOR THESE FREE BULLETINS ON JOY COMPRESSORS

JOY WG-9 • 15 to 75 Horsepower • 95.6 to 939 CFM

Single cylinder, single stage, double acting, water cooled. Joy vertical design saves space . . . fits right into plant expansion plans. Fourteen models. Bulletin shows cross-section diagram with construction and operation details.

JOY WN-112 • 60 to 150 Horsepower • 368 to 974 CFM

Two cylinder, two stage, double acting, water cooled. Joy pioneered the V-vertical design in 1936 . . . thousands of these units in operation. Nine models available. Bulletin gives complete details on construction and operation.

JOY WN-114 • 175 to 600 Horsepower • 1186 to 3896 CFM

Four cylinders, two stage, double acting, water cooled. Joy semi-radial design provides maximum capacity in very little space. Eight models. Bulletin gives complete construction details.

JOY MANUFACTURING COMPANY, OLIVER BLDG., PITTSBURGH, PA.

EQUIPMENT FOR INDUSTRIAL PLANTS...FOR ALL INDUSTRY

WRITE FOR BULLETIN SET 156-15

AIR & GAS COMPRESSORS

FANS AND BLOWERS

ELECTRICAL CONNECTORS

OIL FREE COMPRESSORS

WSW 16471-156

For more facts circle 516 on Reply Card

FIRE-SNUF®: the fiberglass

Tamed and matured, yet so modern and versatile, Fire-Snuf fire retardant panels of fiberglass meet the most exacting of advanced design for that new look in plants and factories, as well as requirements for safety, utility and durability.

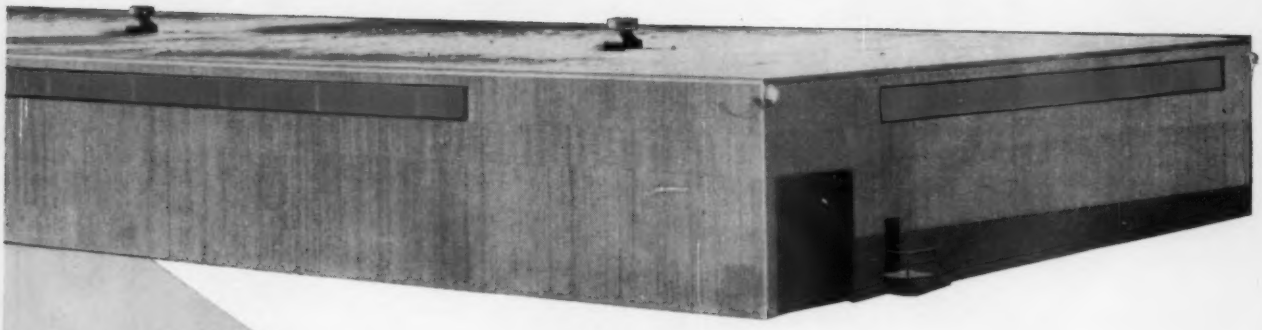
Fire-Snuf bands of daylight enhance industrial structures across the U.S. Everywhere engineers and architects, assured by Factory Mutual approval and the Underwriters' label, are specifying and making full use of this quality panel that lets in so much natural daylight for so little installation cost and maintenance.

Fiberglass products by Resolite also include Resolite standard corrugated panels, glazing flats, Consolite self-flashing skylights and the popular new Security Panel with embedded expanded metal for high impact strength.

RESOLITE CORPORATION

World's largest producers of fire retardant fiberglass panels

panel that came of age!



Literature

A 20-page manual, "Construction Engineering Details", and the reports of Factory Mutual and Underwriters' Laboratories are available upon request.

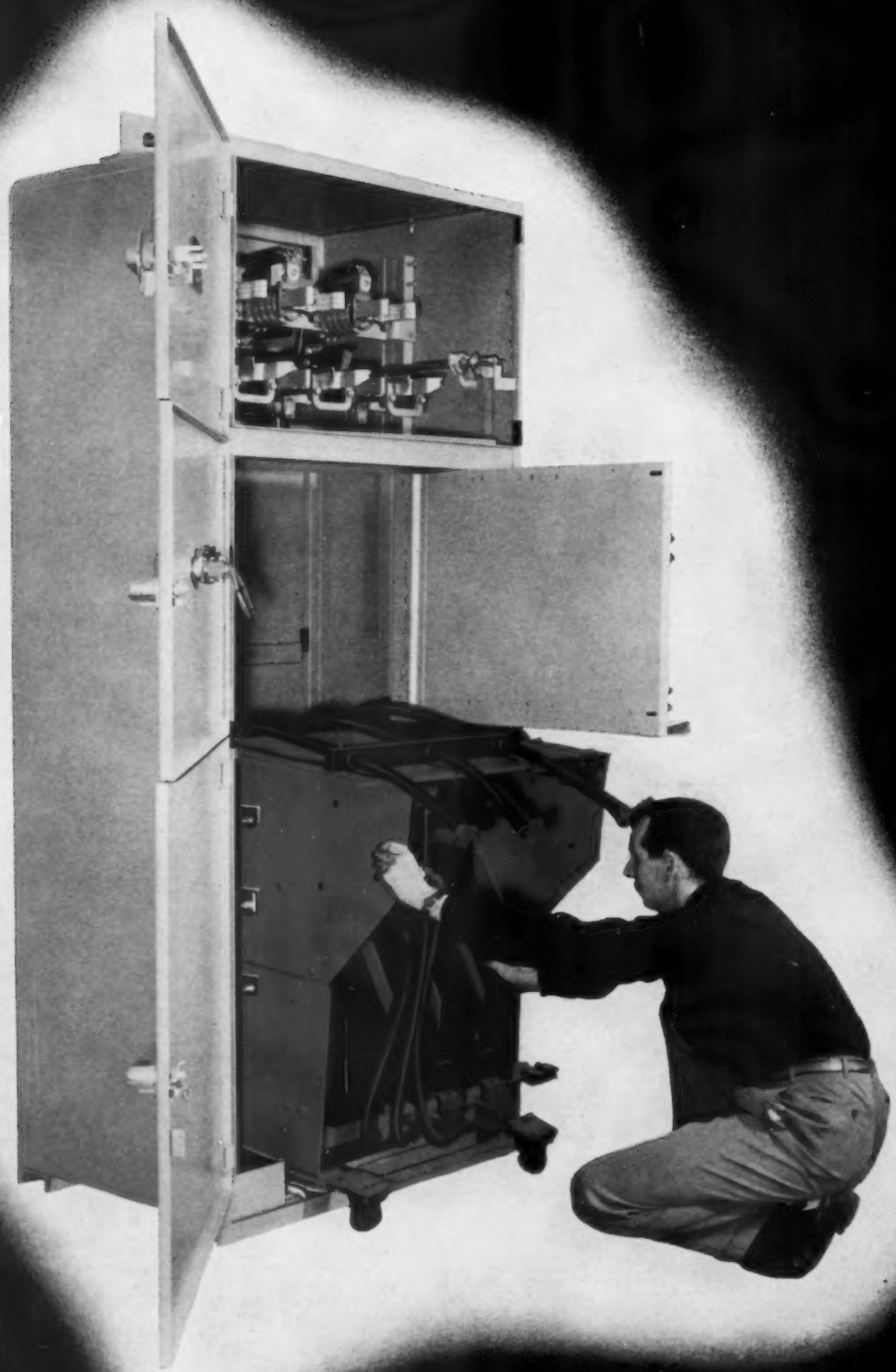
Genuine FIRE-SNUF, the pioneer fire retandant fiberglass panel was first to bear both these labels:

MAIN OFFICE AND PLANT, ZELIENOPLE, PA.

DISTRIBUTORS IN PRINCIPAL CITIES, U. S. AND CANADA
RESOLITE CORPORATION (Canada) Ltd., 1548 THE QUEENSWAY, ETOBICOKE, TORONTO
RESOLITE EXPORT SALES, 905 BANKERS MORTGAGE BLDG., HOUSTON 2, TEXAS

For more facts circle 517 on Reply Card **For more facts circle 518 on Reply Card →**

HIGH-VOLTAGE MOTOR CONTROL.....



GENERAL ELECTRIC LIMITAMP* STARTERS OFFER ROLL-OUT CONTACTOR UNITS FOR EASIER INSTALLATION

Today's General Electric Limitamp starters are designed to bring you the utmost in installation ease, speed, and economy.

Key feature of this cost-cutting design is the caster-mounted contactor unit which can be easily rolled into or out of the Limitamp enclosure. After swinging out the hinge-mounted low-voltage panel, and before rolling in the contactor unit, the installation man can walk right inside the enclosure to make connections quickly and conveniently.

Once connections are completed, the panel can be closed and ready to operate within minutes. Limitamp panels control and protect motors rated 2300 to 4800 volts and ranging up to 3000 horsepower.

MORE LIMITAMP CONTROL FEATURES

Fast, economical installation is but one benefit of General Electric Limitamp control. There are many more. For instance:

- Extra five-square-foot space savings on large motor applications by using higher capacity fuses to eliminate need for extra fuse cabinet.
- Increased personnel safety provided by three-phase disconnect switch.
- Flexible arrangement of units and added space savings, with all connections made from front.
- Complete range of modifications to meet any installation requirement.

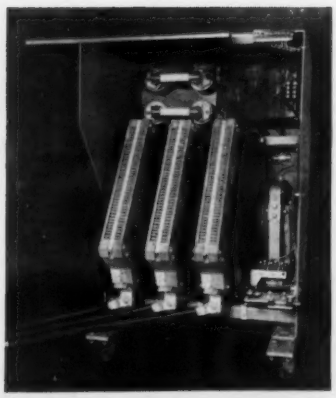
REALIZE THESE BENEFITS NOW

Don't be satisfied with "old-fashioned" high-voltage motor control: Specify General Electric's Limitamp control—*leader in design and performance.* Contact your G-E Apparatus Sales Office today, or write Section 783-2, General Electric Company, Schenectady, New York.

Industry Control Department, Roanoke, Virginia.

Progress Is Our Most Important Product

GENERAL ELECTRIC



MAINTENANCE EASY on contactor; generally devices are front-removed.

THERE'S AMPLE SPACE to stand inside enclosure and make necessary connections. Yet entire control requires 50% less floor space than before.

*Reg. Trade-mark of General Electric Company.

You Pay Less...
(per month of service)
for
CHEMPRO TEFLON* PACKINGS

Long Life Chempro Teflon Packings last for many months under corrosive conditions which destroy conventional packings in days... even hours. Replacement cost on the basis of service life cannot be compared.

Ideal for sealing pump and other rotating shafts against acids, caustics, aromatics, chlorinated hydrocarbons and other powerful corrosives. What's more, they give a *truly tight seal* with only slight gland pressure. Their low coefficient of friction makes lubrication unnecessary. See Bulletin CP 552.

3 types...
- TEFLON RING SETS
- TEFLON V-RINGS
- TEFLON IMPREGNATED ASBESTOS RINGS

THE ORIGINAL FABRICATORS OF TEFLON PACKINGS AND GASKETS

*duPont Trademark

CHEMICAL & POWER PRODUCTS, Inc.
7 Broadway, New York 4, N. Y.

For more facts circle 519 on Reply Card

BACKTALK AND FORETHOUGHTS

Edited by Marjorie E. Weissman

Permission Granted

PLANT ENGINEERING:

"We were very much interested in the story 'Plant Engineer Plans SPS Move,' as published in the October, 1956 issue of your magazine.

"One of our external publications is 'Construction Products,' a picture-and-caption type magazine in which we show interesting industrial applications of our products. We would like to use a portion of this story in this magazine inasmuch as it applies to the Armco Pipe." *H. B. Mattocks, Advertising Dept., Armco Drainage & Metal Products, Inc., Middletown, Ohio.*

PLANT ENGINEERING:

"The Fred W. Kiemle Co., Toledo, Ohio, would like permission to mimeograph an article from your August, 1956 issue.

"It is titled 'Extra Man for the Plant Engineer' and begins on page 114 of that issue. Distribution of the mimeographed article will be to engineering personnel in their own shop and among customers already on their books." *Jack Solon, Jack Solon Associates, Toledo, Ohio.*

Inquiry from France

PLANT ENGINEERING:

"I was interested to see an article used in the Plant Engineers' Digest of the November issue of PLANT ENGINEERING, which was taken from one of our Technical Digests. Could you let me have, I wonder, a sample copy of PLANT ENGINEERING? I should be very glad to see it." *N. Grell, Head of Technical Information Section, European Productivity Agency, Paris, France.*

Concrete Welding For Cracked Walls?

PLANT ENGINEERING:

"In December, 1956 PLANT ENGINEERING published an article regarding concrete welding, on page 110.

"We are interested in obtaining additional information regarding its application and would like to have a recommendation as to what product would be advisable to use in our situation.

"Our situation is this: We have a 10-ton crane running along the building on the outside and a five-ton crane running on the inside, which causes considerable vibration. This vibration is causing cracks between the concrete blocks and hadite blocks.

"We feel that possibly the material mentioned above could be used in a situation such as ours. If so, what would you recommend us to use, what is the price of this material, the size of containers and what process of application would be necessary?" *R. P. Strassburger, Purchasing Agent, The C. S. Johnson Co., Champaign, Ill.*

PLANT ENGINEERING:

"I would like to have more information on the epoxy compound for concrete welding. We have a number of places where we may be able to use this material for preventing oil seeping through the concrete floor which has been a problem with us for a number of years." *Alexander Benincasa, Chief Electrician, Electric Service Works, Delta-Star Electric Div., H. K. Porter Co., Inc., of Pittsburgh, Philadelphia, Pa.*

► In order that our readers receive complete information on their particular problems, we have forwarded their letters to Mr. Charles Mathieu of Charles Mathieu & Co., 509 Madison Ave., New York 22, N. Y.—*Editors.*

Any Way You Wish

PLANT ENGINEERING:

"Your magazine comes to our plant regularly. It is then sent to the heads of the various departments.

"I am a laboratory technician in the Quality Control department. We are not issued your fine magazine, but we are allowed to read it on our own time.

"I wish to receive some of the literature and tear sheets for my own files and reference library. If I send a facsimile of your card, will you honor my requests?" *Derrel W. Houdashelt, Salinas, Calif.*

► The reply-paid reader service card appearing in each issue of PLANT ENGINEERING is for our readers' convenience, but if they wish to request information, tear sheets or other literature by any other means, they are welcome to do so. —*Editors.*

Construction Booklets Available

PLANT ENGINEERING:

"Some time ago we received the December issue of PLANT ENGINEERING and have noted an article called 'Construction Briefs.' With the receipt of this issue, we started saving these 'Construction Briefs' for the benefit of our personnel and would appreciate it if you would forward to us as soon as possible reprints of this item from previous issues." *H. Wineman, Purchasing Agent, American Chain Div., American Chain & Cable Co., Inc., York, Pa.*

► Preparation has just been completed of three booklets, each of which contains six of the "Construction Briefs." The series has been appearing in PLANT EN-

Mr. R. E. Randall
BUYER
Libby, McNeill & Libby
Chicago, Illinois

"People often are hoggish about paper towels"

WITHOUT realizing it they'll use from two to four single fold towels just for drying.
— wasting up to 40 inches of towelling.
But you can control this waste.
With savings up to 40%!
How?
*By installing WESTROLL TOWELS in West Micromatic Cabinets.**

PEOPLE quickly unroll as little or as much as they want. But without realizing it they take less. Averaging 17 inches of soft, absorbent WESTROLL.
Saves janitors' time, too.
— one filling of the tamper-proof cabinet equals four of a single fold towel dispenser.
— there's less litter to clean up.
And washrooms are cleaner, neater.
**Cabinets are loaned.*

"Westroll Towels cost us 30% less across the U.S.A."

"When you're concerned with a multi-plant operation such as ours, a small savings in an expendable item such as paper towels can mean many valuable dollars saved at the end of the year. We found, by using Westroll Towels in the Micromatic Cabinet, that our costs were reduced by 30% based on a closely supervised comparative test against interfold towels," says MR. R. E. RANDALL, Buyer for Libby, McNeill & Libby, Chicago.

"With these savings, it was only natural that we should shift a major portion of our plant facilities throughout the country over to this efficient and economical toweling. Our washrooms remain neater, too; and we realize additional savings in cabinet-filling time and janitor clean-up time."

Would similar economies interest you? Send the coupon.

LARGEST COMPANY OF ITS KIND IN THE WORLD

WEST DISINFECTING Company

WEST DISINFECTING COMPANY, 42-16 West Street, Long Island City 1, N. Y.
Branches in principal cities • In Canada: 5621-23 Casgrain Ave., Montreal

☐ Please send your free folder on cutting towel costs with Westroll.
☐ Please have a West representative telephone for an appointment.

Name.....

Position.....

Mail this coupon with your letterhead to Dept. 19

For more facts circle 520 on Reply Card

RCA "PREMIUM" TUBES assure *optimum performance* of electronic equipment which must operate under "tough" conditions of vibration, shock, temperature, and humidity. In such equipment their many special qualities of durability minimize early failures, and increase the reliability of operation—*help keep production rolling!*

In many instances, you can improve tube performance by replacing your present tubes with RCA "PREMIUM" TUBES. This chart lists the RCA "PREMIUM" TUBES available through your RCA Industrial Tube Distributor. Ask your RCA Industrial Tube Distributor for a copy of the new booklet RIT-104, or write RCA Commercial Engineering, Section C34Z, Harrison, N.J.

RCA TUBES FOR INDUSTRY
RADIO CORPORATION OF AMERICA
Tube Division • Harrison, N. J.

RCA "PREMIUM" Type No.*	Prototype No.	RCA "PREMIUM" Type No.*	Prototype No.
0A2-WA	0A2	5726/	
0B2-WA	0B2	6AL5-W/6097	6AL5
2D21-WA	2D21	5727/2D21-W	2D21
6AC7-W	6AC7	5749	6BA6
6J4-WA	6J4	5750	6BE6
5636	6AS6	5751	12AX7
5636-A	6AS6	5751-WA	12AX7
5654	6AK5	5814-A	12AU7
5654/6AK5-W	6AK5	5814-WA	12AU7
5654/		5840	.....
6AK5-W/6096	6AK5	5840-A	.....
5670	2C51	6005	6AQ5
5686	.....	6072	12AY7
5690†	.....	6073	0A2
5691†	6SL7-GT	6074	0B2
5692†	6SN7-GT	6080-WA	6AS7-G
5693†	6SJ7	6101	6J6
5718	.....	6101/6J6-WA	6J6
5718-A	.....	6136	6AU6
5719	.....	6186/6AG5-WA	6AG5
5719-A	.....	6189/	
5725	6AS6	12AU7-WA	12AU7
5726	6AL5	6201	12AT7
5726/6AL5-W	6AL5	6205	5840

NOTE: †"Special-Red" Tubes. *"PREMIUM" versions may differ from their prototypes in mechanical and/or electrical characteristics. Check tube data before replacing a prototype with a "PREMIUM" type.

For more facts circle 521 on Reply Card

BACKTALK—FORETHOUGHTS

GINEERING for the past three years and each booklet represents one of these years. The booklets were published because we no longer have a supply of tear sheets of the previous briefs. They cost 50 cents each. The series includes material published up to August, 1956.—*Editors.*

Planned Painting

PLANT ENGINEERING:

"We read with a great deal of interest the article in the December, 1956 issue of PLANT ENGINEERING on 'A Planned Repainting Program' and would like to get some information on the polyvinyl acetate paint used at Convair. We have a similar problem in a craneway at one of our plants, where bricks are stored underneath and absolutely no paint can come into contact with these bricks without lowering their value considerably. We will appreciate any information you might give us." *R. P. Trowbridge, Engr. Chg. Construction, Merry Bros. Brick and Tile Co., Augusta, Ga.*

▶ Mr. Trowbridge's letter has been forwarded to Mr. J. W. Vint, Superintendent of Maintenance at Convair, San Diego, Calif., for his comments.—*Editors.*

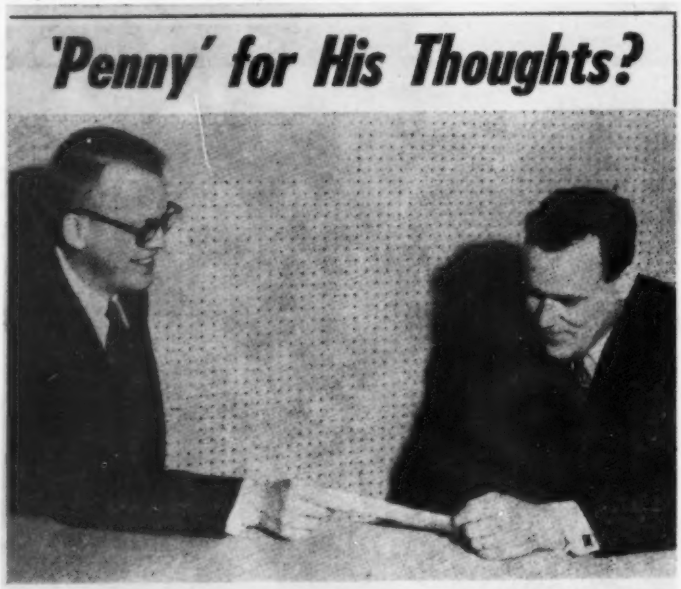
Technical Manuals Listing

PLANT ENGINEERING:

"Referring recently to an article in your issue of April, 1956, (How the Army Controls Maintenance) I noted a partial list of available Technical Manuals covering phases of maintenance. Would it be possible to obtain a complete listing of Technical Manuals?" *L. G. Mustill, Engineering Department, Canadian Industries Ltd., Montreal, Quebec.*

▶ A listing of Technical Manuals available from the United States Government Printing Office is available.—*Editors.*

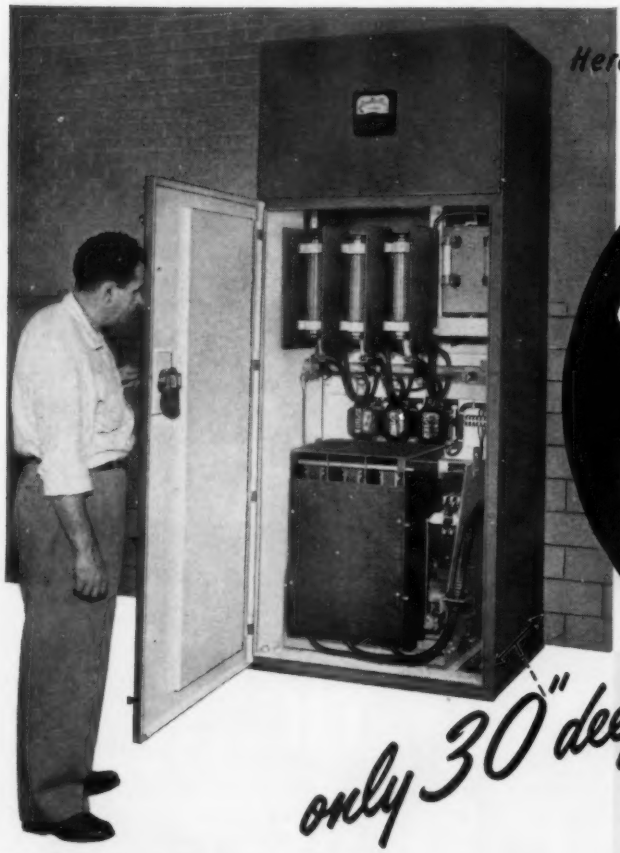
Anyone Else Care To Try?



DIDN'T ANSWER THE $200 QUESTION—You don't have to prove your knowledge on a television quiz program to take home a pocketful of money . . . the ability to express one's self on a given topic will accomplish the same results. Case in point: George E. Wralstad, right, manager-plant facilities and maintenance, Small Integral Motor Dept., who is shown accepting Plant Engineering magazine's $200 check for an article he wrote and which has been accepted for publication in the January issue. Mr. Wralstad's article is titled "Controlled, Engineered Maintenance." John R. Stoutland, left, SIM advertising and sales promotion specialist, presented the check on behalf of the publication.

This picture story appeared in a January issue of General Electric News, published by General Electric Company's Fort Wayne, Ind. plant. It tells its own story. Mr. Wralstad's article, "Engineered Maintenance Is Better, 10 Ways," appeared in our January issue, starting on page 94

Here is **DESIGN LEADERSHIP** *... in Action!*



Save Space with New EC&M High Voltage (2200-4800 VOLTS) Starters

only 30" deep!

Accessible from Front...

(Solid back) • Starters may be mounted against wall or in double row, back to back

Safe...

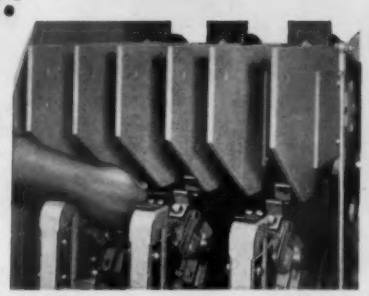
Starter DISCONNECTED from bus as door is opened
Low voltage section isolated from high voltage

Interlocked...

against accidental closure by simple rod mechanism
Large wiring space for incoming leads

EC&M's new ZHA Starter not only saves valuable floor space—it provides more accessibility and convenience than ever before. Starters are available with self-contained bus in isolated compartment. A gang of starters requires only one incoming feeder. Additional starters can be added as needed—with no sacrifice in neat, streamlined appearance. All starters are self-contained and complete with control transformer supplying low voltage for pushbutton circuits.

***Write for* BULLETIN 8130-F**



NO DRAW-OUT NEEDED • Arc shields slide out horizontally, making front and rear contact-tips removable with standard wrench.

3 Interrupting Ratings for Squirrel Cage, Synchronous and Wound-rotor Motors

1. **CLASS E 1** • 50,000 KVA (symmetrical) based on certified tests.
2. **CLASS E 2** • With current limiting fuses and high interrupting capacity contactor. At 2300 volts: 150,000 KVA, 3 phase; 60,000 RMS amperes asymmetrical. At 4,800 volts: 250,000 KVA, 3 phase; 60,000 RMS amperes asymmetrical.
3. **VALIMITOR®** • May be used on a bus of unlimited short circuit capacity, through the use of a contactor with an interrupting rating of 50,000 KVA, and reactors which limit any fault current to a maximum of 25,000 KVA.

THE ELECTRIC CONTROLLER & MFG. CO.
A DIVISION OF THE SQUARE D COMPANY
CLEVELAND 28 • OHIO

7955

For more facts circle 522 on Reply Card

■ The 16,000 users of YARWAY Blow-Off Valves include utilities, industrial plants, institutions and government installations—well-known plants and plants you've never heard of; large plants, small plants; with boilers of every pressure rating.

But there's one thing these companies have in common—*dependable blow-down service*. Their YARWAY Blow-Off Valves give them advanced engineering design, improved metallurgy, careful workmanship, exacting test standards and experienced field service.

On blow-off valves, *go* YARWAY—*with confidence.*

UTILITIES

Boston Edison Co.
Consolidated Edison Co.
Jersey Central Power & Light Co.
Penna. Power & Light Co.
Philadelphia Electric Co.

INDUSTRIALS

Atlantic Refining Co.
Bethlehem Steel Co.
E. I. du Pont de Nemours & Co.
Eastman Kodak Co.
Dow Chemical Co.
Chesapeake & Ohio Railroad Co.
Aluminum Co. of America
American Tobacco Co.
Celanese Corporation of America
Cities Service Oil Co.
Container Corp. of America
Arizona Public Service Co.
Florida Power Co.
Public Service Co. of Oklahoma
Texas Power & Light Co.
Metropolitan Edison Co.
Central Illinois Public Service Co.
Cleveland Electric Illuminating Co.
Iowa Electric Light & Power Co.
Nebraska Power Co.
Tennessee Valley Authority
Calif. Elec. Power Corp.
Colorado Public Service Co.
Pacific Power & Light Co.
Southern Calif. Edison Co.
Washington Water Power Co.
R. J. Reynolds Tobacco Co.
Goodyear Tire & Rubber Co.
Hercules Powder Co.
Armour & Company
International Harvester Co.
Monsanto Chemical Co.
Procter & Gamble Co.
U. S. Steel Co.
United Air Lines
Westinghouse Electric Co.
Weyerhaeuser Timber Co.

INSTITUTIONS AND GOVERNMENT

Harvard Medical School
Metropolitan Housing Project (N.Y.)
New York State Schools
Philadelphia Public Schools
U. S. Veterans' Hospitals
Kentucky State Hospital
Oklahoma A & M College
Texas A & M College
University of North Carolina
Carnegie Institute of Technology
Indiana State Reformatory
Massillon (Ohio) State Hospital
Purdue University
University of Chicago
Mare Island Naval Shipyard
Puget Sound Naval Shipyard
U. S. Prison (Alcatraz)
Western Reg'l Lab. Dept. of Agriculture

YARWAY BLOW-OFF VALVES ARE KNOWN BY THE COMPANIES THEY KEEP

Yarway Seatless Blow-Off Valves, angle-straightway tandem. Note balance sliding plunger design. There is no seat to score, wear, clog or leak. Write for Bulletin B-426.

YARNALL-WARING COMPANY
145 Mermaid Avenue,
Philadelphia 18, Penna.
BRANCH OFFICES IN PRINCIPAL CITIES

YARWAY STEAM PLANT EQUIPMENT

For more facts circle 523 on Reply Card

B.F.Goodrich

Corrosion stopped—production never, with rigid Koroseal idler rolls

YOU are looking at the underside of a conveyor belt on which peeled, juicy apples ride sixteen hours a day at the National Fruit Product Company in Martinsburg, West Virginia. The belt gave excellent service. But the idlers—that was an altogether different story, until rigid Koroseal entered the picture.

Constantly soaked with acetic acid from the apples, regular wooden idlers wore out in a hurry. Frequent replacement and resulting unscheduled downtime proved costly. Plant engineers sought as the ideal idler one that was waterproof, acid resistant and with unusual wearing qualities. They came up with the answer by fabricating in their own machine shop idler rolls of rigid Koroseal polyvinyl chloride pipe which they normally stock for other corrosion applications. Maintenance costs for replacing idler rolls have now ceased.

Koroseal PVC ignores water, oil, salts, most acids and alkalies. Koroseal won't corrode, takes scuffing and impacts that would ruin other materials.

Rigid Koroseal comes in sheets, rods or pipe, complete with Koroseal fittings. You can cut, drill, thread, and weld it. And Koroseal never needs painting—the grey color is an integral part of the material itself.

It's quite possible that Koroseal can make your operations more efficient, more profitable. Write today for more information. *B.F.Goodrich Industrial Products Company, Marietta, Ohio.*

B.F.Goodrich

INDUSTRIAL PRODUCTS CO.

B.F.Goodrich Industrial Products Co.
Dept. PE-3
Marietta, Ohio

Please send me free booklets on:

☐ Rigid Koroseal Pipe
☐ Rigid Koroseal Sheet

Name_____

Company_____

Address_____

City_____ **Zone**____ **State**____

Koroseal—T. M. Reg. U. S. Pat. Off.

For more facts circle 524 on Reply Card

B.F.Goodrich Tire

Use the right industrial tire with the right tread design and tread compound—save up to 50% on tire costs!

1 All-Purpose **2** Universal **3** Wheelbarrow Express **4** Ribbed (trailer) **5** Zero Pressure

1 At the Port of Portland dock, variable waterfront weather conditions and uneven work loads present a materials handling problem. All-Purpose Pneumatic industrial tires help maintain fast schedules. These tires are best for jobs where loads range from light, bulky items to big, heavy equipment. They reduce driver fatigue, virtually eliminate damage to traffic routes.

2 Truck cranes and straddle trucks moving heavy loads in factory yards usually operate more efficiently on Universal Pneumatic industrial tires. These tires give better traction in forward or reverse, and provide maximum load-carrying capacity and flotation.

Numbers indicate recommended type tire

Buyer's Guide

No matter how specialized your materials handling job, there's a B. F. Goodrich industrial tire to match your job requirements. This is possible because B. F. Goodrich makes a complete line of industrial tires in a wide range of types, sizes, tread designs and tread compounds.

Pictured below are several of the more commonly used types of B. F. Goodrich industrial tires. Each tire is numbered. Photographs with identical numbers show how these tires answer specific materials handling problems.

6 Smooth Tread

7 DeLuxe Cushion Traction Tread

8 Grooved Tread

9 DeLuxe Cushion Smooth

10 Flat Base Traction Tread

11 Vulcanized-on

11 **Maximum efficiency** often can be obtained by using a combination of two or more kinds of industrial tires. The truck pictured has a Pressed-On tire on the main drive wheel—Vulcanized-on tires on the other two wheels.

9 **Fast, quiet and cushioned!** These new electric sit-down trucks run quickly and quietly through the aisles of this big Food Fair warehouse. Smooth Tread DeLuxe Cushion Pressed-On tires help cushion fragile food loads.

10 **20% grades** in all kinds of weather with full loads present no problem for this truck. It's equipped with B.F.Goodrich Traction tires for extra pull.

Numbers indicate recommended type tire

B.F.Goodrich Tire

Use the right industrial tire with the right tread design and tread compound—save up to 50% on tire costs!

1 All-Purpose 2 Universal 3 Wheelbarrow Express 4 Ribbed (trailer) 5 Zero Pressure

1 Greater stability is a big feature of the new All-Purpose Pneumatic industrial tire. The tread is wide, with a continuous center rib and husky shoulders

Numbers indicate recommended type tire

3 Easier hauling. The B.F.Goodrich Wheelbarrow Express Pneumatic tire simplifies wheelbarrow jobs. Loads are easier to manage. Cushioning reduces strain and jarring. Flotation prevents bogging down in mud.

1 All-weather traction. Whether new All-Purpose tires are used indoors or outside, or a combination of these, they deliver traction that can't be beat. Many users refer to the All-Purpose as "the most versatile tire we've found."

For more facts circle 525 on Reply Card

Buyer's Guide

No matter how specialized your materials handling job, there's a B. F. Goodrich industrial tire to match your job requirements. This is possible because B. F. Goodrich makes a complete line of industrial tires in a wide range of types, sizes, tread designs and tread compounds.

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6 Smooth Tread

7 DeLuxe Cushion Traction Tread

8 Grooved Tread

9 DeLuxe Cushion Smooth

10 Flat Base Traction Tread

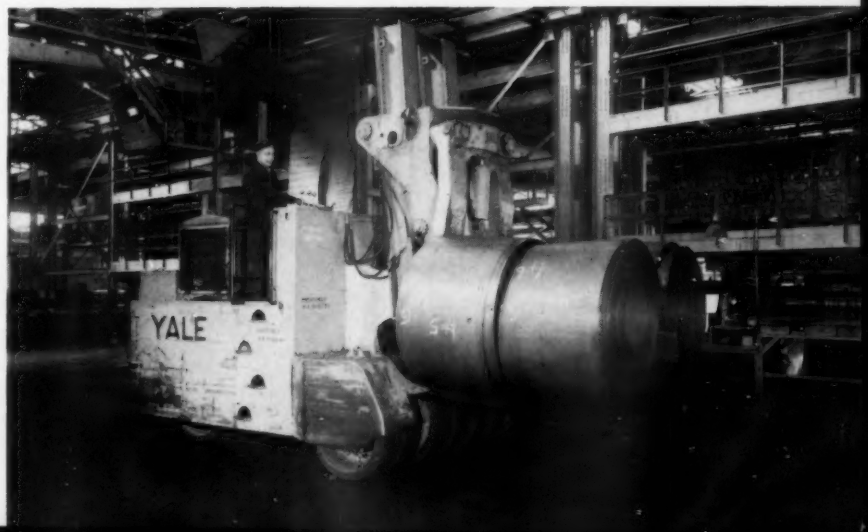
11 Vulcanized-on

6 **1,540,000 pounds of paper per day** is handled in the plant of the Philadelphia Bulletin by only six specially equipped trucks. Smooth Tread Pressed-On Solid tires with wide treads absorb shock, provide load protection, reduce floor wear, and lessen driver fatigue on this big job.

7 **Oily aluminum shavings** make Pressed-On tires with special oil and cut-resisting DeLuxe Cushion traction tread a necessity at this busy smelting plant. B. F. Goodrich offers a wide range of tread compounds and tread designs to meet special requirements.

Numbers indicate recommended type tire

8 **Easier steering** is made possible because this huge truck is equipped with B. F. Goodrich Pressed-On tires with Grooved Tread. They will carry extremely heavy loads in severe service. The Universal compound resists cuts from abrasive scrap, too.



B.F.Goodrich Tire

Use the right industrial tire with the right tread design and tread compound—save up to 50% on tire costs!

1 All-Purpose **2** Universal **3** Wheelbarrow Express **4** Ribbed (trailer) **5** Zero Pressure

1 Capacity for heavy loads is assured by the strong body, rugged shoulders and the versatile tread of the new B.F.Goodrich All-Purpose industrial pneumatic tire.

Numbers indicate recommended type tire

5 For small, light loads that must be moved short distances under favorable conditions, Zero Pressure tires provide extra cushioning and long, economical wear.

1 Traction on every surface. Indoors or outdoors, new All-Purpose Pneumatic tires provide outstanding traction. A heavy center rib around the tire assures long, even tread wear. Pneumatic cushioning protects loads, cuts down noise and reduces driver fatigue.

Buyer's Guide

No matter how specialized your materials handling job, there's a B. F. Goodrich industrial tire to match your job requirements. This is possible because B. F. Goodrich makes a complete line of industrial tires in a wide range of types, sizes, tread designs and tread compounds.

Pictured below are several of the more commonly used types of B. F. Goodrich industrial tires. Each tire is numbered. Photographs with identical numbers show how these tires answer specific materials handling problems.

6 Smooth Tread

7 DeLuxe Cushion Traction Tread

8 Grooved Tread

9 DeLuxe Cushion Smooth

10 Flat Base Traction Tread

11 Vulcanized-on

FREE TW ANALYSIS plan can save you up to 50% on industrial tire costs!

Making sure that you have the right industrial tires on your materials handling equipment can mean large savings in tire costs and maintenance expense. The best way to do this is to request a free B. F. Goodrich Tire and Wheel Analysis. The B. F. Goodrich TW Analysis man knows which industrial tire is best for your equipment and job requirements. His recommendations are unbiased because B. F. Goodrich makes a *complete* line of industrial tires. His suggestions have resulted in savings of up to 50% on tire costs and up to 20% on maintenance costs for many companies. Just mail the coupon. No obligation. A consulting service also is available to manufacturers of materials handling equipment.

For more facts circle 525 on Reply Card

Specify B. F. Goodrich tires when ordering new equipment

B.F.Goodrich
FIRST IN RUBBER

B. F. Goodrich Tire Company
A Division of The B. F. Goodrich Company
Department TW-625, Akron 18, Ohio

I would like further information on your FREE TW Analysis.

NAME_____

COMPANY_____

STREET_____

CITY_____ ZONE____ STATE_____

Neither Rain, Nor Sleet, Nor Mud . . . slowed the installation of this AMVIT* LINE

If you can dig the trench, you can install Amvit Jointed Clay Pipe. Bad weather and mud won't slow the laying of an Amvit line.

The joint is on the pipe delivered to the job ready for use. Nothing else is needed. Just push the pipe together and the joint is complete.

No other materials such as caulking, joint compound, joint runners, hot-pots, or ladles are needed to make the Amvit Joint. Savings on materials and labor mean *lower cost of pipe in place.*

Amvit is a compression type joint on the ball and socket principle. No adhesives or other compounds are needed to make a tight seal. Once the joint is complete, nothing can enter or leave the line.

Amvit Jointed Clay Pipe, in sizes 4" through 24", together with all fittings, is available for immediate delivery in the Northeast and Central States.

For more information and our new Amvit brochure, write or call American Vitrified Products Company, National City Bank Building, Cleveland, Ohio, or our office nearest you.

SINCE 1900

AMERICAN

American Vitrified Products Company

CLEVELAND, OHIO

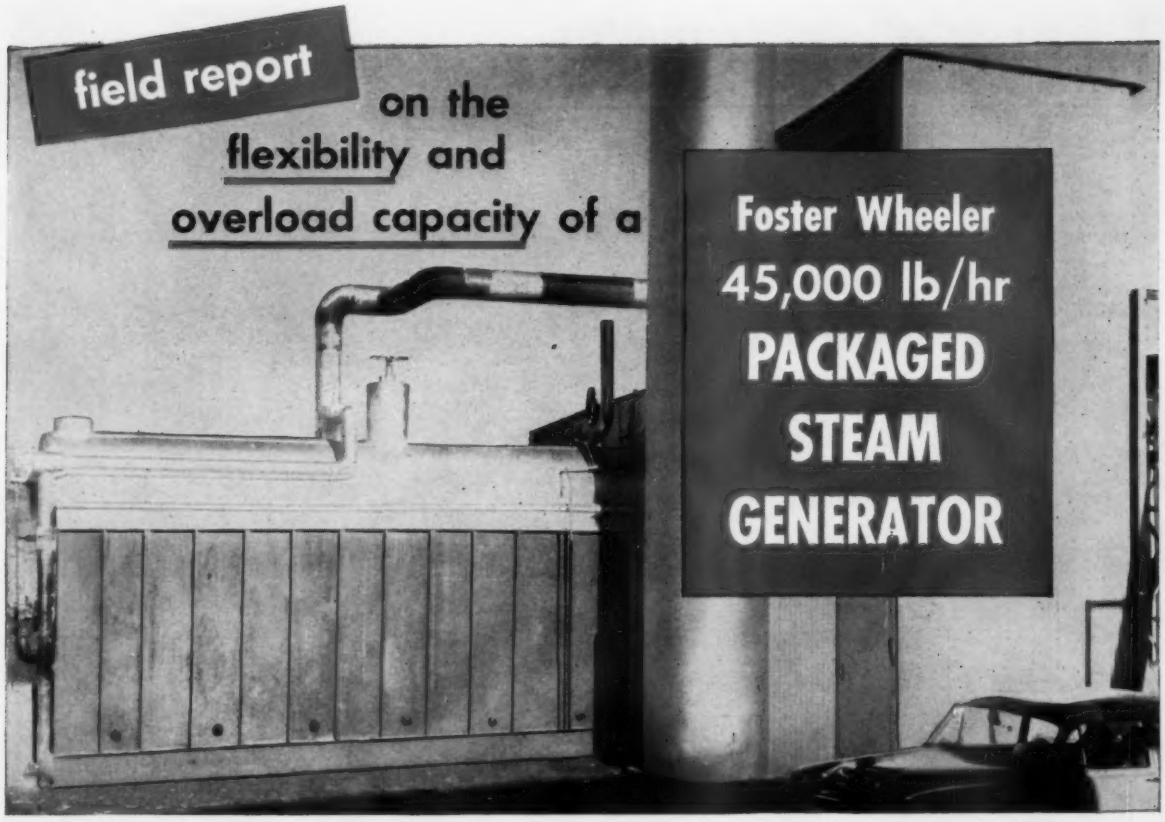
*T.M. Registered, Patents Pending

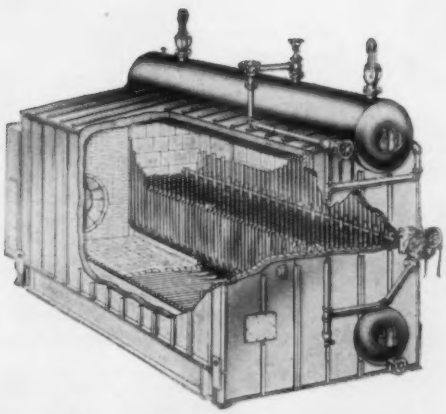
The Amvit joint is made of an acid resistant plastic material with rubber characteristics. Like the pipe, the joints will not be harmed by any condition of underground service. The pipe is simply pushed together. The trench is then ready for backfilling.

MANUFACTURERS of: Clay pipe, flue liners, clay liner plates and concrete pipe.

Plants Across the Nation... Brazil, Indiana • Chicago, Illinois • Cleveland, Ohio • Crawfordsville, Indiana • Detroit, Michigan • East Liverpool, Ohio Fenton, Michigan • Grand Ledge, Michigan • Lisbon, Ohio • Los Angeles, California • Milwaukee, Wisconsin • South Bend, Indiana • Uhrichsville, Ohio

For more facts circle 526 on Reply Card





Cutaway drawing of FW Packaged Steam Generator of the type shown installed above at a large New England chemical plant. Except for the firing front, the entire unit is located out of doors. The performance tests mentioned here were made in December, under typical New England weather conditions.

FOSTER WHEELER engineers have conducted extensive performance tests on a 45,000 lb/hr oil-fired Packaged Steam Generator installed at a large New England chemical plant.

During a 30-day period, the unit was operated at 42,500 lb/hr on a 24-hour basis, delivering over 1,000,000 lb of steam per day. It was also operated at 46,500 lb/hr over an 8 hr period.

Efficiency at design load of 45,000 lb/hr exceeded contract requirements of 83.2%. During performance tests the boiler was operated in excess of 51,000 lb/hr at an efficiency of 82%.

Although purchased as a base load unit, tests were also conducted to determine its flexibility. Rapid load swings from 10,000 to 51,000 lb/hr were set up while on automatic control. The boiler was able to swing from one extreme to the other in considerably less than 60 seconds.

This very satisfactory performance stems from the conservative FW design and generous water storage capacity which are important features of the entire standard line. Available in rated capacities from 10,000 to 50,000 lb/hr, with wide choice of burners and controls. For complete information, send for Bulletin No. PG-55-3. *Foster Wheeler Corporation, 165 Broadway, New York 6, N.Y.*

FOSTER WHEELER

NEW YORK • LONDON • PARIS • ST. CATHARINES, ONT.

For more facts circle 527 on Reply Card

PLANT ENGINEERS' DIGEST so those who rush may read and know what's new

Edited by Marjorie E. Weissman

Bags Glued Together For Palletized Loads

ANOTHER STEP toward automation is the result of our company palletizing loads of calcium chloride and some other bagged chemicals and plastics, for shipment.

The 100-lb bags are loaded onto expendable pallets in a box car or truck, using either a four-bag pinwheel, or three-bag T pattern. The bottom bags are secured to the pallet with an adhesive and, if shipped by rail, additional tiers of bags are also attached to each other with the adhesive. In this way, the bags can withstand the shifting caused by shock and humping during transit. Adhesive is not used on truckload shipments unless requested.

Because of the gluing the bags are slightly defaced wherever the glue has come in contact with the paper. Ordinarily there is no tearing, but if this does occur, only the outer layer of the bag is affected. *From Dowflakes, published by Dow Chemical Co., Midland, Michigan.*

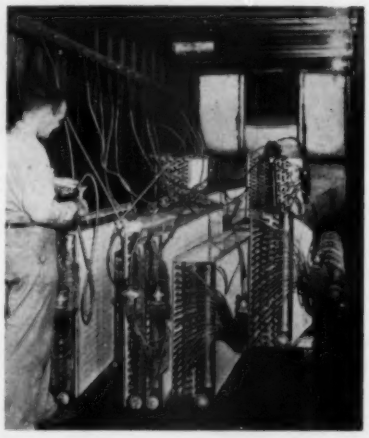
Special Hose Helps With Dehydration Problem

WHEN METAL tubing used in dehydrating heat exchanger coils failed under constant use, Kennard Corporation, St. Louis, Mo., solved the problem by installing specially-engineered flexible hose assemblies.

The dehydration process is used on all direct expansion coils, liquid chillers, and evaporative condensers, and consists of baking the coils for six hours under vacuum. Oven temperature is 280 F; vacuum is 700 microns absolute pressure.

Previously, metal tubing was used to connect the coils to a manifold, which in turn was connected to a vacuum pump. However, under constant use the tubing, bent to fit between the coils into the manifold, work-hardened

(Continued on page 44)



Operator connects flexible hose for high temperature, low vacuum dehydration

Working Safely With Scaffolding Depends Upon Proper Practices

ADHERENCE TO PROPER practices in the use of scaffolds will help reduce accidents. Following is a list of safety practices for three types of scaffold used for maintenance and repair work.

Sectional scaffolds:

1. Keep scaffolds plumb and level at all times. Use adjusting screws rather than blocking.
2. On exterior work, tie in to the wall every 25 ft of height and every 28 feet of length.
3. Use guard railing at all heights.
4. Never climb on cross braces.
5. Set base plates on sills to spread the load on soft ground.
6. Check all wing nuts and locks.
7. Use horizontal cross braces in addition to diagonal braces.
8. Make sure planking meets load requirements.
9. Never use even slightly damaged material.

Metal sectional rolling scaffolds:

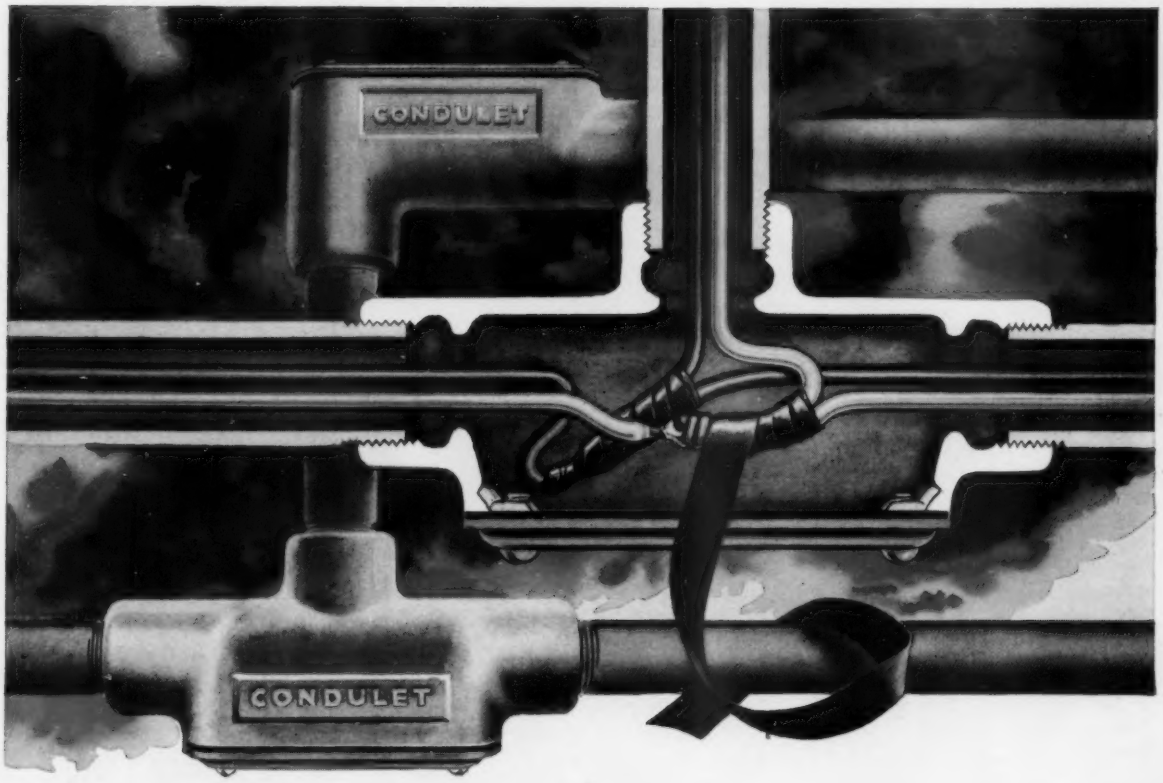
1. Lock all caster brakes when tower is in working position.
2. Height of working platform should not exceed four times smallest base dimension.
3. Do not extend adjusting screws fully.
4. Provide sufficient horizontal bracing.
5. Never allow workmen to pull themselves along while on top of rolling scaffold.

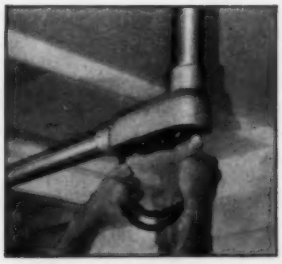
Light-duty swinging scaffolds:

1. Keep all bearing points well lubricated.
2. Inspect ratchet and locking pawl springs to see that they are in good working condition.
3. Keep weight of men and materials evenly distributed. Never overload.
4. Reinforce outriggers if the overhang exceeds distance specified.
5. Properly install toe boards and guard rails.
6. Keep pawls engaged at all times, except when unreeling wire ropes or lowering scaffold.
7. Do not alter, remove or substitute parts.
8. Overlap planks at least one foot on each side of putlog.

From a release of The Patent Scaffolding Co., Inc., Long Island City, N. Y.

Outriggers stabilize scaffold; on swinging type, weight must be well distributed





Condulets install easily. There's room inside to do a good wiring job. No sharp edges to scrape knuckles or cut into insulation. Once installed, wiring, Condulet and conduit are there to stay—yet wiring remains easily accessible for future alterations.

Used everywhere. There is a Condulet for every need, in every conceivable industry. Each one bears the marks of superior construction. Each is *made* by craftsmen to the standards craftsmen demand!

Why electrical engineers specify

"CONDULETS . . . OR APPROVED EQUAL"

Electrical engineers are called upon daily to make careful choices of materials for companies who depend upon their judgment for the quality of finished work.

"Condulets or approved equal" is the common notation on specification prints everywhere. It is used to indicate *the standard of performance* demanded by the electrical engineer.

More than 15,000 items of Condulet electrical equipment offer a broad choice of explosion-proof, dust-tight or conventional construction unparalleled for safety and dependability. In *any* plant, the chances are 2 to 1 you will find Condulet junctions, switches, conduit fittings, plugs and receptacles, panelboards, pushbutton stations, motor control centers, etc. Wherever you see the name Condulet, you see the standard by which maximum performance is measured.

A NATIONWIDE DISTRIBUTION exclusively through ELECTRICAL DISTRIBUTORS

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There's an experienced product engineer ready to help you, at the nearest Crouse-Hinds office. Call: Baton Rouge Birmingham Boston Buffalo Chicago Cincinnati Cleveland Corpus Christi Dallas Denver Detroit Houston Indianapolis Kansas City Los Angeles Milwaukee New Orleans New York Philadelphia Pittsburgh Portland, Ore. Salt Lake City St. Louis St. Paul San Francisco Seattle Tulsa Washington RESIDENT REPRESENTATIVES: Albany Atlanta Baltimore Charlotte Chattanooga Jacksonville Reading, Pa. Richmond, Va. Shreveport **Crouse-Hinds Company of Canada, Ltd., Toronto, Ont.**

For more facts circle 528 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 42)

to the point where it soon fractured and became useless. In addition, slight fractures which went unnoticed often necessitated running an entire batch of coils through the process a second time.

Approximately 20 flexible hose assemblies, 8 ft in length and 5/16-in. I.D., were installed as vacuum lines between the manifold and units to be dehydrated. Brass couplings were used to make connections between the coils and manifold.

Each assembly consists of a specially compounded and extruded Teflon resin tube, designed to withstand temperatures of 450 F to 500 F and pressures up to 1000 psi. The tube is jacketed in stainless steel wire braid and is fitted with blow-off-proof steel couplings. None of the hoses has failed in the two years since installation. *From a release of Resistoflex Corp., Roseland, N. J.*

Carbide Knives for Woodworking

EIGHT STEPS are suggested by engineers of the Metallurgical Products Department for mounting cemented carbide knives in planers used in woodworking plants to help prevent mistakes and loss of production time.

When installing carbide knives:

1. Keep carbide knives in the shipping container and remove them one at a time to set them into position on the cutterhead.

2. Snug up the two end and the middle clamping screws so the clamping gib will just hold the knife in place. Weight of the hand on the clamping wrench is usually enough pressure. If you can't turn the knife-lifting screws with one hand to adjust the knife to proper height, the clamping screws are too tight.

3. Using the crowfoot, set the knife to the approximate height. This is done by moving the crowfoot back and forth past the cutting edge until the crowfoot adjusting screw just "ticks" the cutting edge of the knife. Do not clamp knives tightly at this point.

After all the knives are installed:

4. Set one knife with dial indicator to within 0.001 in. from end to end. Use this setting as the standard and adjust the remaining knives to exact concentricity.

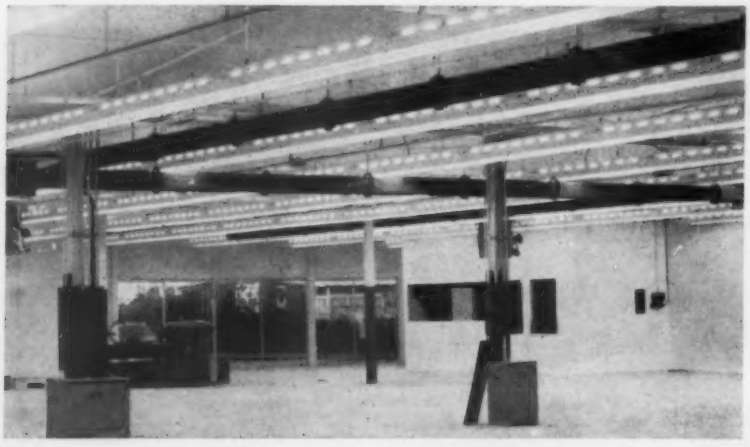
5. Set the knives by adjusting the knife lifting screws directly opposite the three tightened clamping screws.

6. As proper setting is reached at the ends and middle of the knife, completely tighten the opposite clamping screws.

7. Use only three clamping points to provide maximum free length between clamping points. Small adjustments can then be made between these points. Carbide knives have some flexibility, but not as much "spring" as steel. Do not hesitate to loosen a clamp to re-adjust the knife if necessary.

8. The knives can be adjusted to within 0.001 in. without difficulty. However, if one knife is high, it can be brought into concentricity when ground in the cutterhead. *From a release of General Electric Co., Detroit, Michigan.*

Slotted Fixtures Give More Light, Less Contrast



Light, normally trapped between lamp and fixture, escapes through slots in fixtures to light ceiling at new Fairchild Engine & Airplane Corp. plant in Los Angeles, Calif. Apertures induce airflow around lamps, cut down contrast, cleaning costs. (From a release of Globe Lighting Products Inc., Los Angeles, Calif.)

Batteries for Emergency Light

POWER FAILURES which follow a hurricane have caused business interruptions lasting from a few hours to several days. To forestall such occurrences, a Philadelphia department store equipped its branch store with a 110-v emergency lighting system employing a 94-cell, nickel-iron storage battery to furnish power during outages.

Photo: Courtesy Thomas A. Edison, Inc.

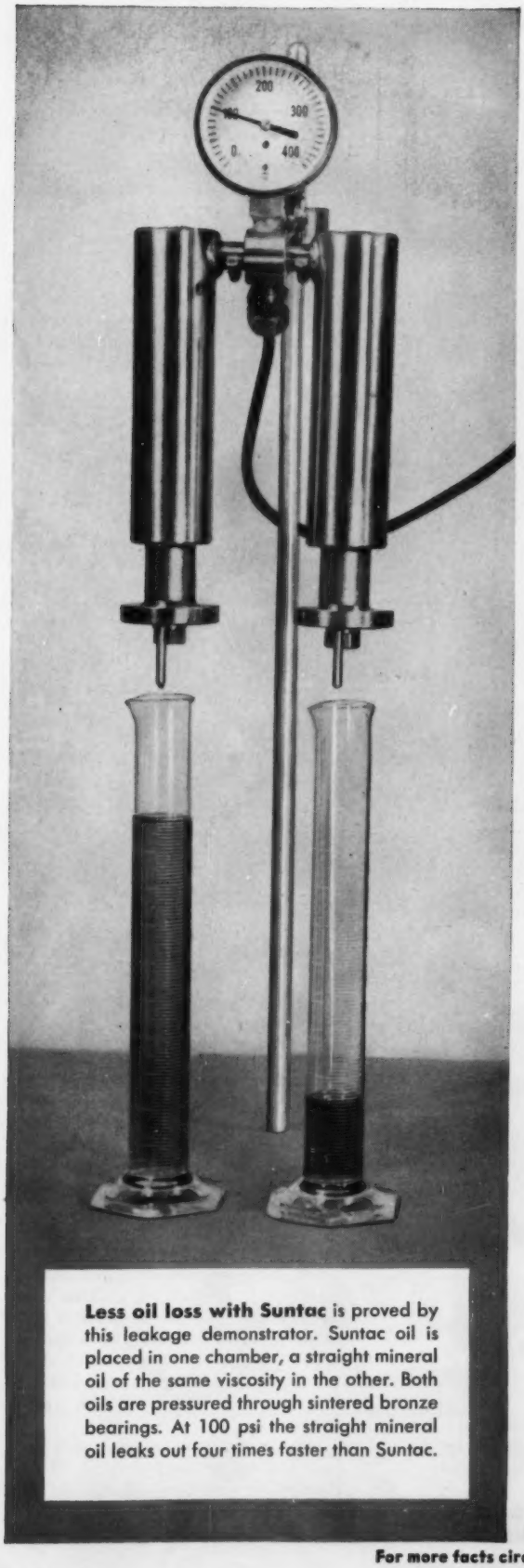
Two, 94-cell nickel-iron storage batteries provide emergency lighting in store

In October, 1954, a hurricane caused intermittent power failures for two days, in the city. When the lighting failures occurred at the store, a power-transfer relay automatically closed the circuits between the batteries and the emergency lights. The batteries kept the emergency lights burning throughout the series of outages, eliminating possible hazards to store customers.

Since that time, the store has been enlarged, necessitating an increase in the number of emergency lights and in battery capacity. A battery, similar to the original one which was still in top operating condition, was installed.

The batteries are normally trickle-charged and are supplied with a rectifier to maintain the battery in a charged condition at the rate of approximately ½ amp. There is provision for increasing the rate following a failure of the normal power source.

The store is equipped with both fluorescent tubes and incandescent lamps supplied from 110-v, a-c power. During an outage, d-c power is provided by the battery to incandescent lamps. The same wiring is used for both a-c and d-c power. *From Inco*



Less oil loss with Suntac is proved by this leakage demonstrator. Suntac oil is placed in one chamber, a straight mineral oil of the same viscosity in the other. Both oils are pressured through sintered bronze bearings. At 100 psi the straight mineral oil leaks out four times faster than Suntac.

LEAKAGE DEMONSTRATOR PROVES SUNTAC CAN CUT OIL LOSS AS MUCH AS 75%

Expensive equipment overhauls to stop leaks in hydraulic systems can often be avoided by a change to Suntac®. The exceptional antileak characteristics of Suntac oils can reduce oil losses as much as 75%, as can be proved in the leakage demonstrator. *Some users have reported actual drops in oil leakage of 90%.*

Suntac oils give you lower lubrication costs, cleaner equipment and floors, safer working conditions. Their leak-reducing agent leaves no gummy film or residue. In addition, Suntac oils are fortified against oxidation to lengthen oil life...against rust and corrosion to lengthen equipment life.

You'll find Suntac a money and time saver in your hydraulic systems...and a high-quality general-purpose oil for many other uses.

WANT MORE SUNTAC FACTS? Ask your Sun representative for Technical Bulletin 23. Or you can get full details, prices, and delivery information by writing to SUN OIL COMPANY, Philadelphia 3, Pa., Dept. PY-3.

SUNOCO

©Sun Oil Company

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY

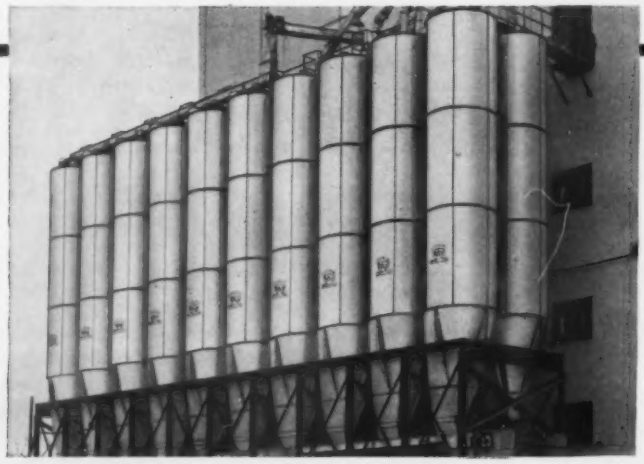
Philadelphia 3, Pa.

In Canada: Sun Oil Company Limited, Toronto & Montreal

For more facts circle 529 on Reply Card

Cut Material Handling Costs with

DAY BULK MATERIAL TANKS

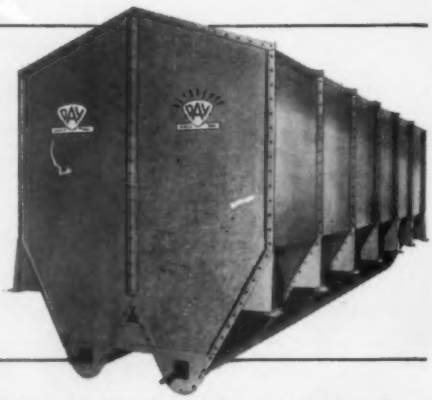


Each of these DAY vertical bulk material tanks has an approximate storage capacity of one carload. They serve as storage tanks for a packaging line as well as for truck and railcar loading. Every day more and more plants find large quantities of dry bulk materials can be handled more economically using DAY bulk material tanks. They save labor, containers and storage costs.

DAY bulk material tanks are made of black iron, galvanized or stainless steel. They are built and shipped in *easily erected, bolted sections*. Vertical tanks are furnished in sizes from 3 to 14 feet in diameter, up to 100 feet high. No support is required above the cone level. Patented, suspension discs are available for vertical type tanks to prevent bridging and assure free flow of product.

DAY Horizontal Bulk Material Tanks

Using DAY horizontal bulk material tanks, companies report savings of up to 25¢ per bag compared to handling bulk materials in bags. Ideal for buildings with limited headroom. Standard or special sizes available. Low installation cost.



For detailed information on bulk material storage tanks and pneumatic conveying equipment to suit your production and storage needs, write toDAY for Bulletins 529 and 549.

The **DAY** *Company*

Sold in United States by
The DAY SALES Company
807 Third Ave. N.E., Minneapolis 13, Minn.

Made and sold in Canada by
The DAY Company of Canada Ltd.
P.O. Box 70G, Fort William, Ontario

Representatives in Principal Cities

DAY BULK MATERIAL HANDLING SAVES MONEY

For more facts circle 530 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 42)

Magazine, published by The International Nickel Company, Inc., New York, New York.

Inflating Tires Safely

MOBILE TIRE inflation rack used for inflating high pressure tires, which has been in use at our International Falls garage for the past 10 years, saved

Mechanic inflates tire in special rack

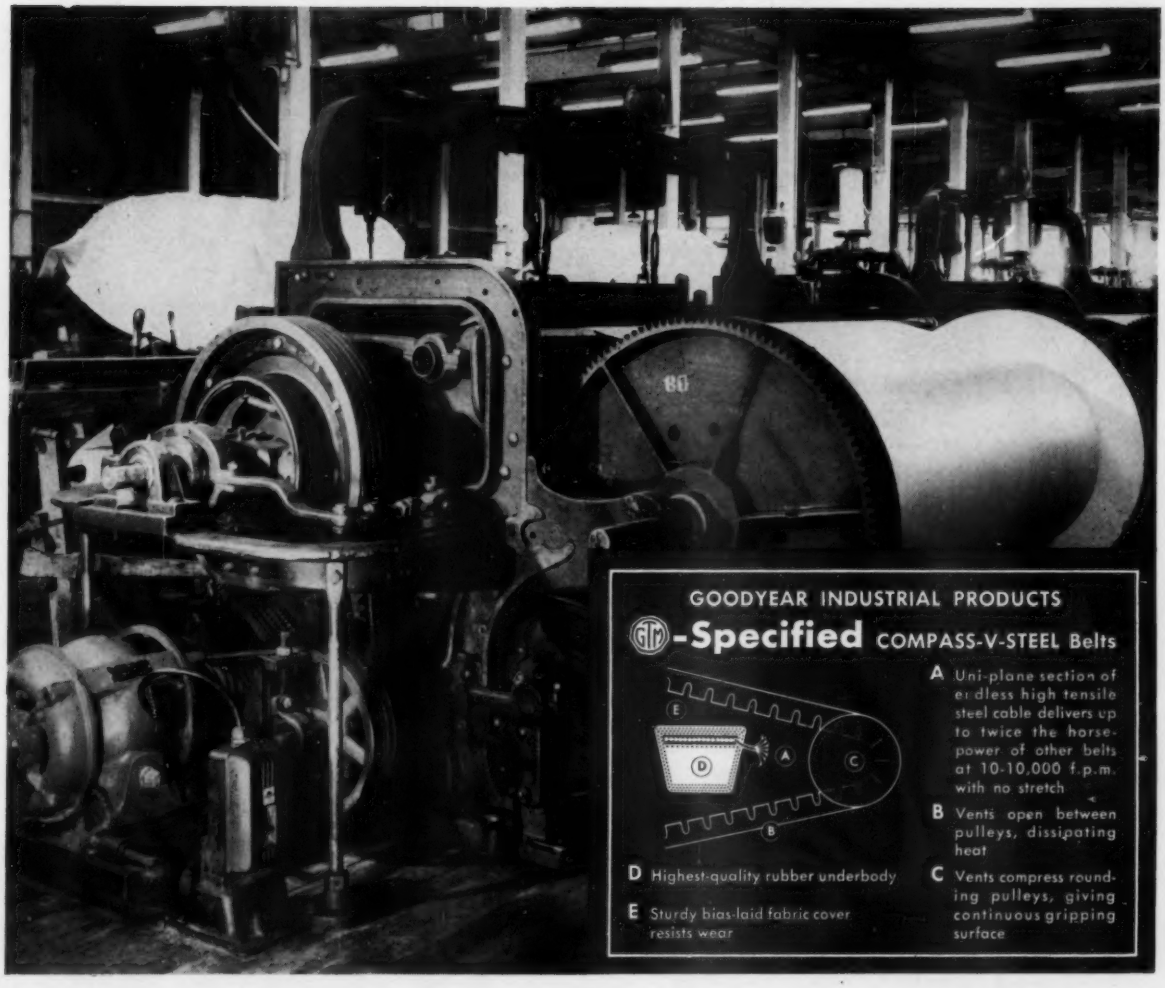
Rack safely confines a blown-out tire

one of our mechanics from possible serious injury.

Heavy duty tires used on trucks at that plant have a split rim and locking ring. During inflation there is danger of the locking ring blowing off with great force.

For inflating, tires are rolled into the rack which consists of a three-sided box made of heavy sheet metal. A hole in each side of the rack allows the air hose to be placed on the valve stem. A steel stud, passing through holes in the rack walls and the wheel, secure the tire.

On one occasion, when a tire had been inflated to approximately 70 psi, the locking ring blew off and the tire and wheel assembly exploded. The rack confined the locking ring, preventing


GOODYEAR INDUSTRIAL PRODUCTS
G.T.M.-Specified COMPASS-V-STEEL Belts
A Uni-plane section of endless high tensile steel cable delivers up to twice the horsepower of other belts at 10-10,000 f.p.m. with no stretch
B Vents open between pulleys, dissipating heat
C Vents compress rounding pulleys, giving continuous gripping surface
D Highest-quality rubber underbody
E Sturdy bias-laid fabric cover resists wear

G.T.M. ups V-Belt life on looms from hours to year

BECAUSE of too frequent gear replacement, standard V-belts were tried on these jolting, heavy duck loom drives. But then the belts lasted only a few hours.

The G.T.M.—Goodyear Technical Man—answered this problem with COMPASS-V-STEEL Belts (see blueprint). These steel-muscled belts are still going strong after over a year's service with minimum take-ups.

The G.T.M. or Goodyear Distributor may solve your V-belt or other industrial rubber problems with equal success. Why not call them? Or write Goodyear, Industrial Products Division, Akron 16, Ohio.

COMPASS-V-STEEL BELTS by

GOODYEAR

THE GREATEST NAME IN RUBBER

Compass—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

IT'S SMART TO DO BUSINESS *with your Goodyear Distributor. He can give you fast, dependable service on Hose, V-Belts, Flat Belts and many other industrial rubber and nonrubber supplies. Look for him in the Yellow Pages under "Rubber Goods" or "Rubber Products."*

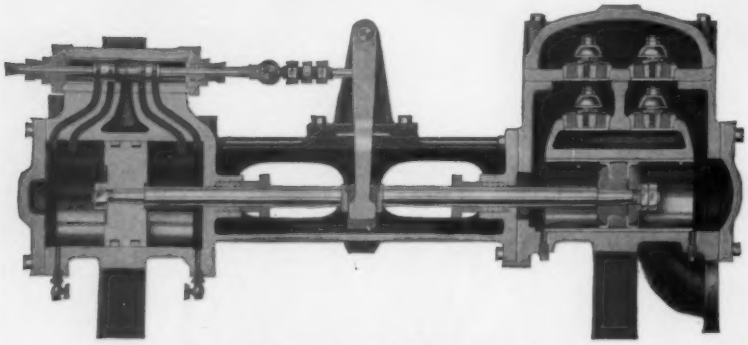
For more facts circle 531 on Reply Card

SAVE 95%

on your Pumping Cost . .

using the WARREN "Realwear" Horizontal Duplex Steam Pump with Piston Valve Steam Chest

featuring special steam piston ring and steam chest piston valve ring construction, in addition to balanced steam chest piston valves and graphitic iron liners.



NOTE THESE ADVANTAGES:

- Oil-free exhaust steam.
- Clean exhaust steam for any purpose
- Protection of boilers.
- No contamination of returns.
- Economy . . . 95% recovery of fuel cost when exhaust steam utilized.
- Reliability . . . not dependent upon electricity.
- Flexibility to meet varying load conditions with efficiency at all points.
- Adaptability to either manual or governor control and to long periods of shut-down, if necessary, without addition of oil or graphite.
- Elimination of any type lubricator.
- Outside valve adjustment.

This construction can save you money on Boiler Feed and all Steam Processing applications.
ASK FOR "REALWEAR" BULLETIN

P-32

WARREN

Warren Pumps, Inc.
Warren, Massachusetts

For more facts circle 532 on Reply Card

PLANT ENGINEERS' DIGEST

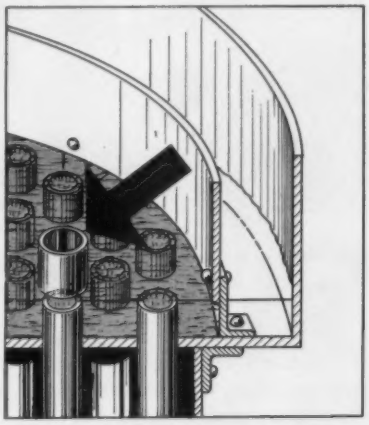
(Digest begins on page 42)

injury to the mechanic handling the job. *From the Mandonian, published by Minnesota and Ontario Paper Co., Minneapolis, Minn.*

Cleaning Open-Shell Exchangers

OPEN-SHELL type water-cooled heat exchangers are still in use in many plants and their relative age should not lead to their neglect. Periodic cleaning can keep the equipment effective and this can be done without taking the heat exchanger out of service.

A length of pipe several inches longer than the tube should be used. It should be large enough to allow a hand to enter. By placing the pipe over the tube to be cleaned, allowing it to project above the tube sheet, most of the water will be prevented from flowing down the tube. This reduces the back pressure on the tube-cleaner motor and permits greater power to be delivered to the cutter head. In addition, the absence of a large amount of water reduces the cushioning effect on cutters and the frictional drag encounters in underwater tube cleaning. *From a release of Thomas C. Wilson, Inc., Long Island City, N. Y.*



Pipe inserted over tube aids in cleaning of open-shell type heat exchangers

Vibration Absorbed

A 45-TON cylindrical grinder in the plant of the E. D. Jones and Sons, Pittsfield, Mass. was installed 40 ft from a mainline railroad track. This made it necessary to find a means of absorbing the vibration from passing trains to prevent chatter marks on the finished work. In addition, a level had

Now Available

through Local Distributors . . .

Perfectly Paired METAL HOSE* *and* Quick-Seal COUPLINGS

Titeflex hose and couplings solve some of industry's most vexing conveyance problems. Handle flow of organic and volatile liquids as well as gases, between moving or misaligned terminals, at wide extremes in temperatures and pressures. Also absorb vibration, pulsation and shock. Couplings couple and uncouple in ONE second . . . are leak-proof at all operating pressures.

Hose sizes: 3/16" to 3" Coupling sizes: ¼" to 12"

**Other tough conveyance problems are solved with Titeflex flexible hose made of TEFLON—a Du Pont tetrafluoroethylene resin—in sizes of ¼" to 1¼"*

CALL YOUR LOCAL DISTRIBUTOR

Consult the yellow pages of your telephone directory

Your one source for both Hose and Couplings

Titeflex

TITEFLEX, INC., 536 HENDEE STREET, SPRINGFIELD 4, MASS.

For more facts circle 533 on Reply Card

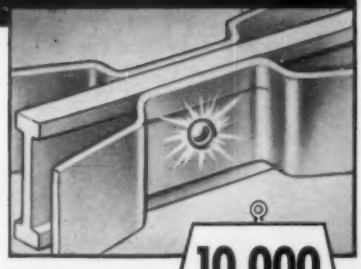
GOLD NUGGET®
WELDED
grating
PAT. PENDING

Realizing the need for an improved heavy duty, open steel floor grating of greater strength and economy, The GLOBE Company presents GOLD NUGGET Welded Grating — the first grating to take advantage of modern engineering design. As a result of this improved design, the GOLD NUGGET primary load bar provides 22% more strength with 14% less weight. The primary load bar is a miniature I-beam with all of the advantages of a true structural member.

GOLD NUGGET Welded Grating is recommended for power houses, loading docks, oil refineries, fire escapes, drain grates, plating rooms, filtration rooms and for all types of heavy duty platforms.

GOLD NUGGET

- ★ 3/16" projection weld nugget for greater rigidity and strength
- ★ vertical alignment of the main load bars assured
- ★ all bars are load carrying bars including secondary bars
- ★ anti-skid pattern



10,000 POUNDS

PROJECTION WELD

Each secondary load bar (A), as projected welded to the primary load bar (B) has a shear strength of 5,000 pounds per weld. There are 28 such projection welds to a square foot of grating. This means that GOLD NUGGET Welded Grating can sustain greater shock loads than other gratings.

For the complete details of this revolutionary new grating, write for new catalog today. Distributors in all principal cities. Consult the yellow pages in your phone book under "GRATING."

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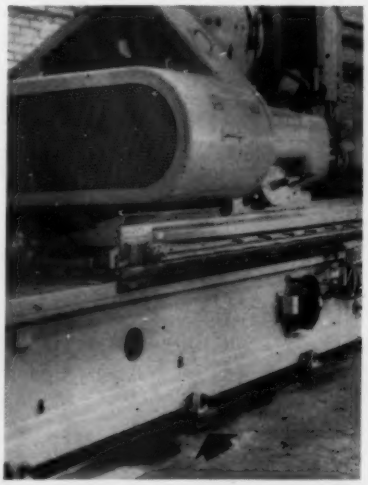
PLANT ENGINEERS' DIGEST

(Digest begins on page 42)



Mounts under cylindrical grinder absorb vibration from nearby mainline railroad

to be maintained to within 0.0005 in.

Both these problems were solved by installing the grinder bed on 26 mounts made of vinyl, sisal and cork and placing a steel plate, ¾ in. thick between each mount. A steel plate installed under the bed of the machine permitted original leveling with jack screws. *From a release of Clark, Cutler, McDermott Co., Franklin, Mass.*

Forced Air Heat Solves Condensation, Heating Problems

FORCED AIR space heating, in addition to providing shirt-sleeve warmth for employees, is being used to overcome a production problem in the magnesium mill of Dow Chemical Company at Madison, Illinois.

Condensation, caused when the magnesium at normal temperature is placed in the 700 F heat of a thermal flattening oven, resulted in damaging discoloration of the metal.

To overcome this condensation problem, the magnesium sheets are preheated in an insulated, hood-type preheat chamber, using a specially adapted, forced air space heater as the heat source. This pre-heat equipment gradually elevates the temperature of a load of sheets to 175 F; the rise taking place over a 4-hr period thus eliminating condensation.

Measuring approximately 32 ft by 10 ft by 8 ft, the pre-heat chamber is large enough to enclose a total load of 55 tons of magnesium. Equipped with crane lifting lugs, the pre-heat chamber

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New paints based on Hypalon® resist ozone, chemicals, heat and weather

NEOPRENE caps protect stored pipe against INTERNAL CORROSION

Internal corrosion is a constant threat to stored piping and tubing, whether plain steel or expensive alloy stock. But a Texas manufacturer has come up with a low-cost solution to this old problem—flexible pipe caps of neoprene, Du Pont's synthetic rubber.

Neoprene caps fit snugly over the ends of a pipe and seal out moisture, corrosive gases, chemicals, rodents and all foreign matter. Pipe threads are kept free of dust and sand . . . drying of thread "dope" is retarded. And this protection is long-lasting, indoors or out-of-doors, since neoprene pipe caps are highly resistant to deterioration from sunlight, weathering, oil and chemicals.

One-eighth inch in thickness, neoprene pipe caps are available in slip-on types for pipes from 2 to 20 inches in diameter. Like all products of neoprene, these caps offer long, cost-saving service whatever the exposure conditions. If you would like to see how other neoprene products cut maintenance costs, just mail the coupon.

FLEXIBLE neoprene caps are snapped over the end of the pipe. They're low-cost protection against corrosion for your pipe inventory, indoors or out.

THERE'S A NEW KIND of industrial maintenance coating on the market. These paints are based on HYPALON, Du Pont's new synthetic rubber. They resist ozone, strongly oxidizing chemicals, heat and weather. And, what's just as important to color-conscious plant engineers and purchasing agents, they come in a range of colors, all of which are stable to sunlight exposure.

HYPALON coatings can be brushed or sprayed. A sprayed coating applied with standard lacquer or enamel spray equipment gives a glossy finish and can be built up in the same way as other coatings.

Whichever method you use, you can get colors that start bright and stay bright —applied inside or outside of your plant. HYPALON coatings can be used to color-code piping systems or to color-condition equipment in the most corrosive areas of your plant. In all cases, your equipment is protected by a resilient, long-lasting coating.

We'll be glad to send you a list of suppliers. Write "Suppliers list" on the coupon. Clip the coupon, also, for information on the many other uses for HYPALON.

EASY TO APPLY, HYPALON coatings are brushed or sprayed on like enamel. They add bright, light-resistant color and long-lasting protection to your plant equipment.

DU PONT
REG. U. S. PAT. OFF.

HYPALON *is a registered trademark of E. I. du Pont de Nemours & Co. (Inc.)*

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- Ideal for positive high temperature limit control in processing of high-cost materials . . . protects against loss or damage to equipment or materials.
- Cuts off heat supply if pre-set temperature is exceeded.
- Element failure safety feature.
- Indicates process temperature at all times.
- Equipped with manual reset button.
- Fully adjustable over entire scale range.
- Available in scale and element ranges of 0 to 900°F. and 0 to 1100°F.
- For use with gas, oil, steam or water valves; or electrical equipment.

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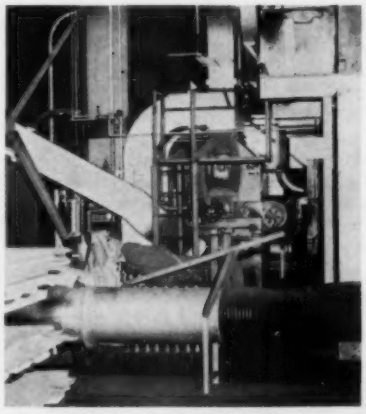
PLANT ENGINEERS' DIGEST

(Digest begins on page 42)

is moved from one side of the thermal flattening oven to the other. While one load is being pre-heated, other loaded cars are moved into position on the opposite side of the oven, so the flattening process is conducted on a continuous basis. Oven loading is done from both sides in alternate fashion.

The 1,000,000-Btu heater is installed adjacent to the thermal flattening oven. Hot air and return air ducts extend in opposite directions parallel to the oven's loading tracks. Flexible hose connections are installed at the ends of the ducts for easy bolting to blast gates of the pre-heat chamber.

The hot air, fed into the pre-heat chamber at the rate of 11,000 cfm, is constantly recirculated, thus building up the chamber temperature at a constant rate. Equipped with a modulating gas burner, the heater uses fuel in accordance with the heat build-up

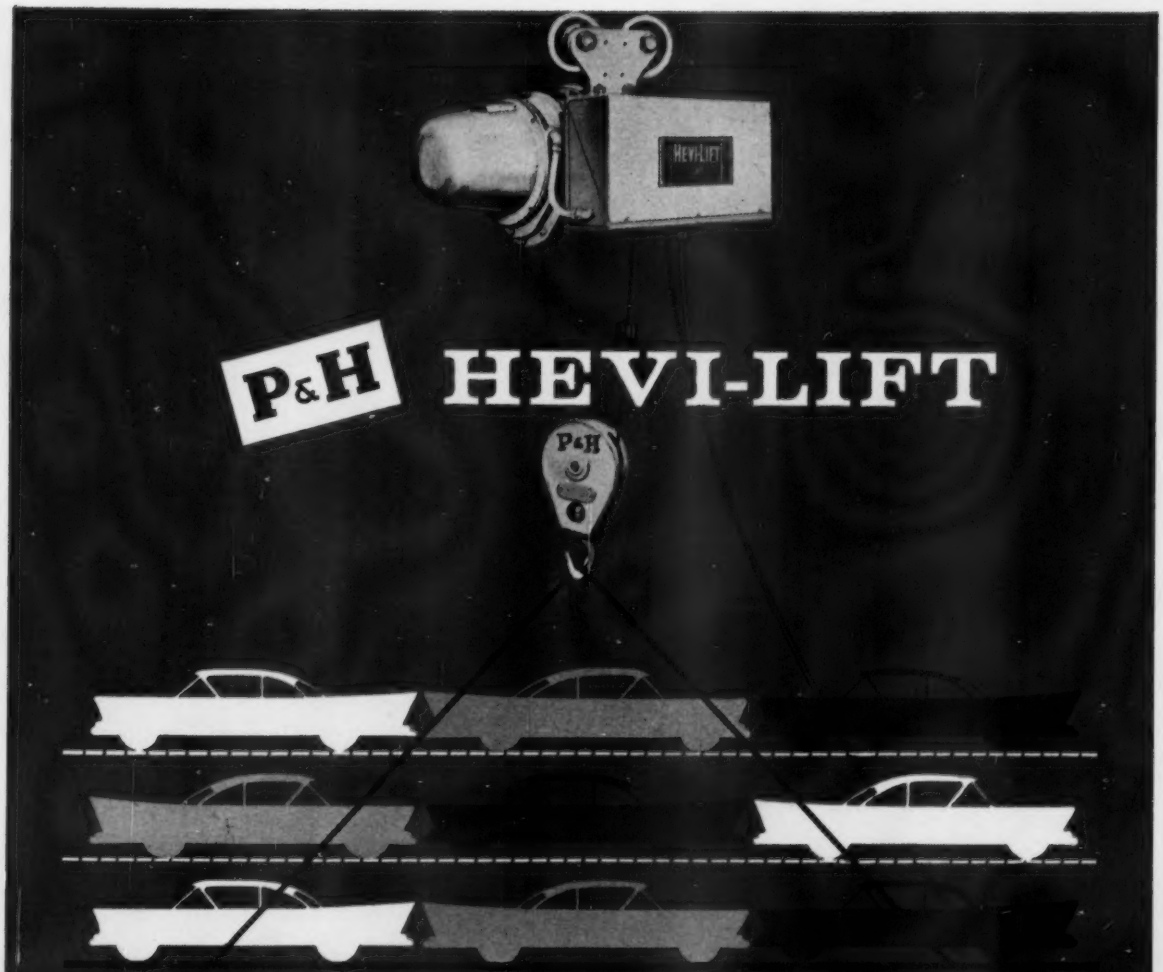


Flexible hose connection, installed at the end of warm air duct, for easy bolting to blast gates of pre-heat chamber

needed after each 4-hr shift of the pre-heat oven.

One hundred ten heaters are located along the walls or are adjacent to supporting columns of the production floor. Temperature in most areas is maintained at 45-50 F, which, coupled with the often intense heat of the machines used in production, is sufficient for shirt-sleeve warmth of workers.

The high velocity of discharge of the air from vents atop the machines, at a height of 12 ft, affords good distribution of warm air. This is pulled, without noticeable draft, to worker level by the intake of air at the floor-level vents in the heating units. Directional flow is controllable. *From a release of Dravo Corp., Pittsburgh, Pa.*



P&H HEVI-LIFT

the safest heavy-duty hoist built

Strong enough to lift the weight of 9 cars...and hold it!

(CAPACITIES 1,000 TO 40,000 LBS.)

You wouldn't try to cut corners on safety. Neither would we — that's why every P&H HEVI-LIFT hoist you buy is built with extra safety features designed to protect your equipment and personnel from mishap.

Every P&H Hevi-Lift has *two* brakes, each fully capable of holding a capacity load. What's more, the new RCD (rectified direct current) brake is the safest, most trouble free hoist brake built. This direct-acting brake has no hinge points . . . no linkage . . . no laminated material . . . and no bushings — assuring substantial savings in maintenance.

Look at the Hevi-Lift before your next hoist purchase. Write for Bulletin H5, "P&H Hevi-Lift Electric Hoists." Address: Dept. 201C, Industrial Division, Harnischfeger Corp., Milwaukee 46, Wisconsin.

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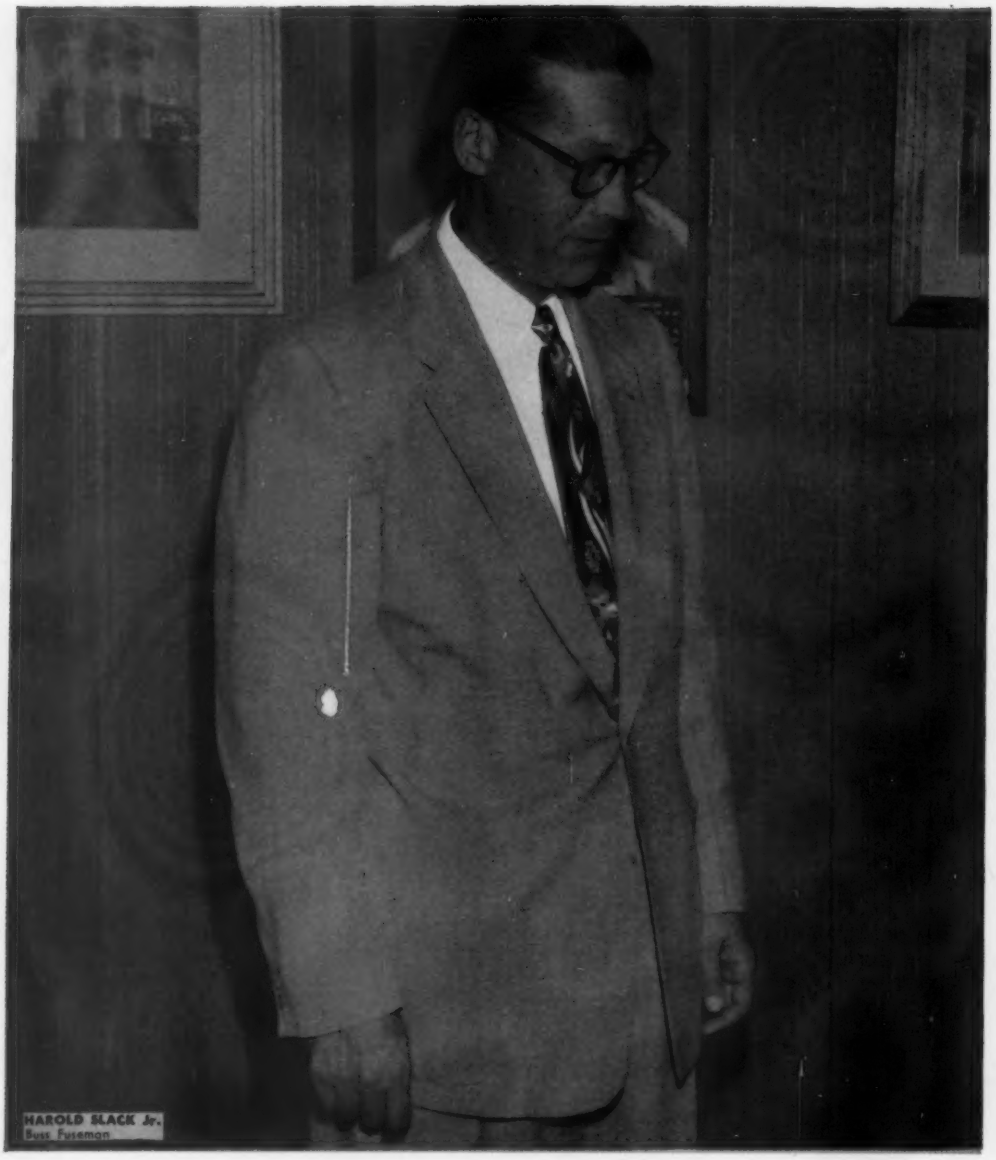
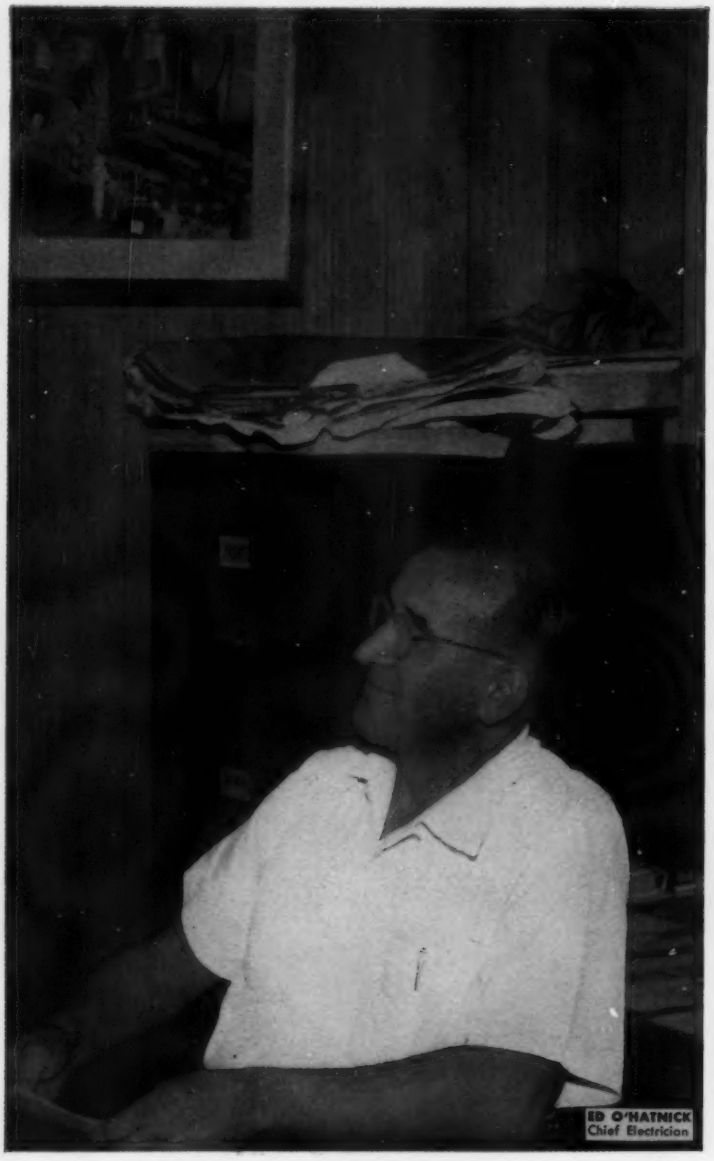


"By installing Fusetron Fuses . . .

We saved from $165 to $225 worth of solenoid coils a year and reduced down-periods"

ED. O'HATNICK, CHIEF ELECTRICIAN
FRANK KNEELAND PLANT, UNITED ENGINEERING & FOUNDRY CO.
PITTSBURGH, PA.



Mr. O'Hatnick continues . . . "The solenoids on the hydraulic clutches of our horizontal boring mills would sometimes stick or slow down when dirt got into the oil.

"When this happened, the tap D. C. solenoid coils wouldn't be pulled in far enough so they would burn up.

"Each coil cost about $15 and with 12 to 18 of them burning up every year it didn't take long for this to add to a considerable amount of money.

"And even more costly were the production losses that resulted from these shutdowns.

"With hope of reducing these expenses, we decided to individually protect the 72 solenoids in use with 3/10 ampere Fusetron dual-element fuses.

"In the next 3 years only 2 coils burned up.

"We had other favorable experiences with Fusetron fuses that convinced me they can make a plant more effective.

"That's why, upon being transferred to our Frank Kneeland Plant, I made a study to see where Fusetron fuses can be applied to help us reduce operating costs."

357

Here's why Fusetron dual-element Fuses protect solenoids, coils and transformers against burnout.

By installing the proper size Fusetron dual-element fuse, a solenoid can be protected. The Fusetron fuse will not open on the operating surge but will open in time to protect, should the heavy current continue too long for any reason.

A transformer or coil, likewise, can be protected because the long time-lag of the Fusetron fuse permits it to hold all normal current surges and harmless overloads—yet it will open to prevent burnout on any dangerous overload.

All you need to protect Coils, Transformers or Solenoids against burnout is a Fusetron fuse plus a fuse block or a BUSS fuse holder.

On voltages up to 125 the same dependable protection can be provided with a proper size Fusetron plug fuse or BUSS Fustat.

FUSETRON FUSES DO MORE THAN PROTECT SOLENOIDS AGAINST BURNOUT . . . ***They Provide 10 Point Protection*** **1.** High interrupting capacity—protect against heaviest short circuits. Have proven on tests to open safely on circuits set to deliver in excess of 100,000 amperes. **2.** Protect against needless blows caused by excessive heating — lesser resistance results in cooler operation. **3.** Protect against needless blows caused by harmless overloads. **4.** Provide thermal protection — for panels and switches against damage from heating due to poor contact. **5.** Protect against waste of space and money — permit use of proper size switches and panels. **6.** Protect motors against burnout from overloads. **7.** Give DOUBLE burnout protection to large motors — without extra cost. **8.** Protect motors against burnout due to single phasing. **9.** Make protection of small motors simple and inexpensive. **10.** Protect coils, transformers and solenoids against burnout.

Write for bulletin FIS.

FOR LOADS ABOVE 600 AND UP TO 5,000 AMPS . . . USE BUSS HI-CAP FUSES! When coordinated with Fusetron fuses they will not open ahead of the fuse nearest fault.

Write for bulletin HCS.

Play Safe! *install FUSETRON dual-element Fuses and BUSS Hi-Cap Fuses throughout entire Electrical System!*

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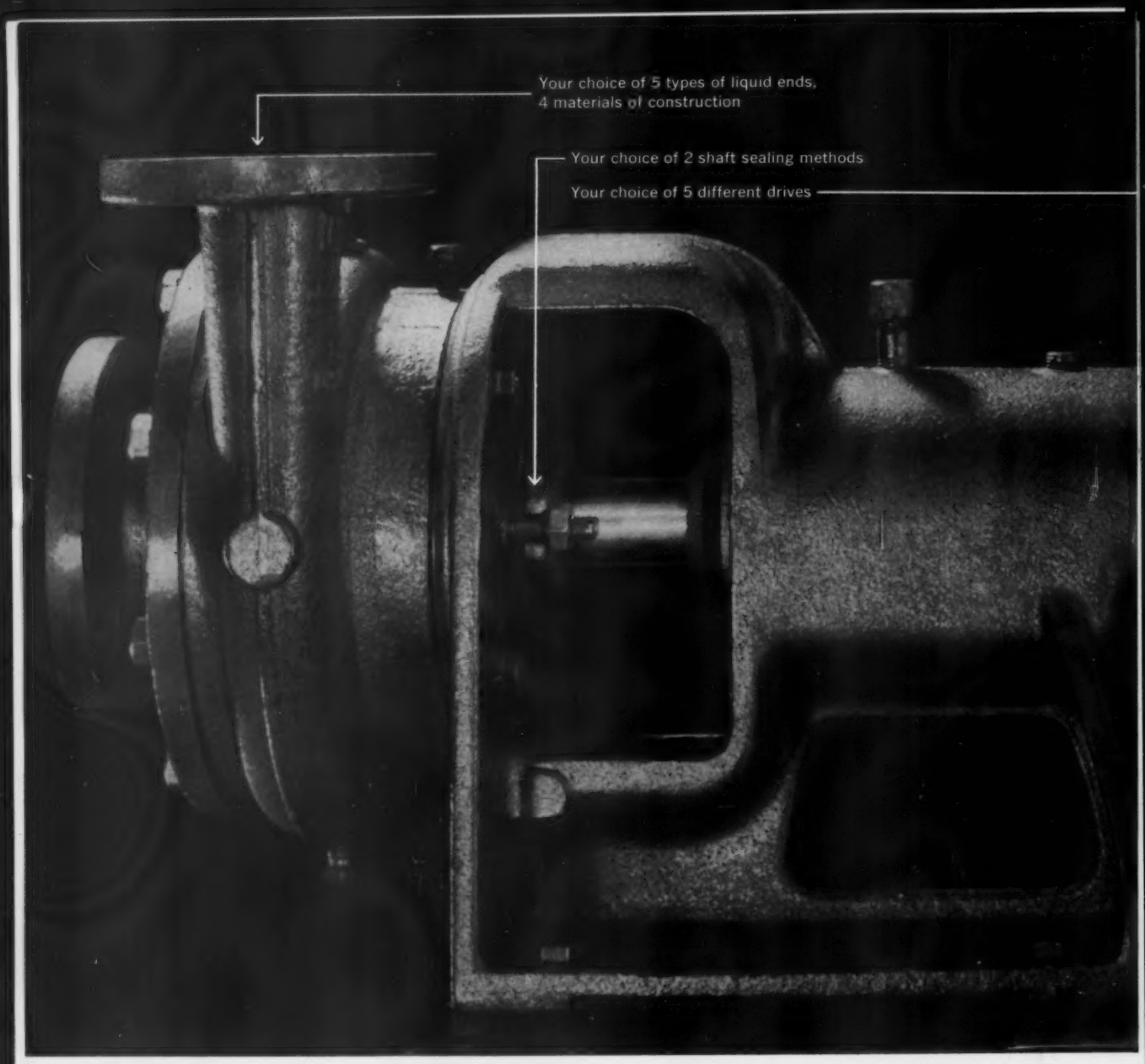

Your choice of 5 types of liquid ends, 4 materials of construction
Your choice of 2 shaft sealing methods
Your choice of 5 different drives

THE PUMP THAT'S RIGHT

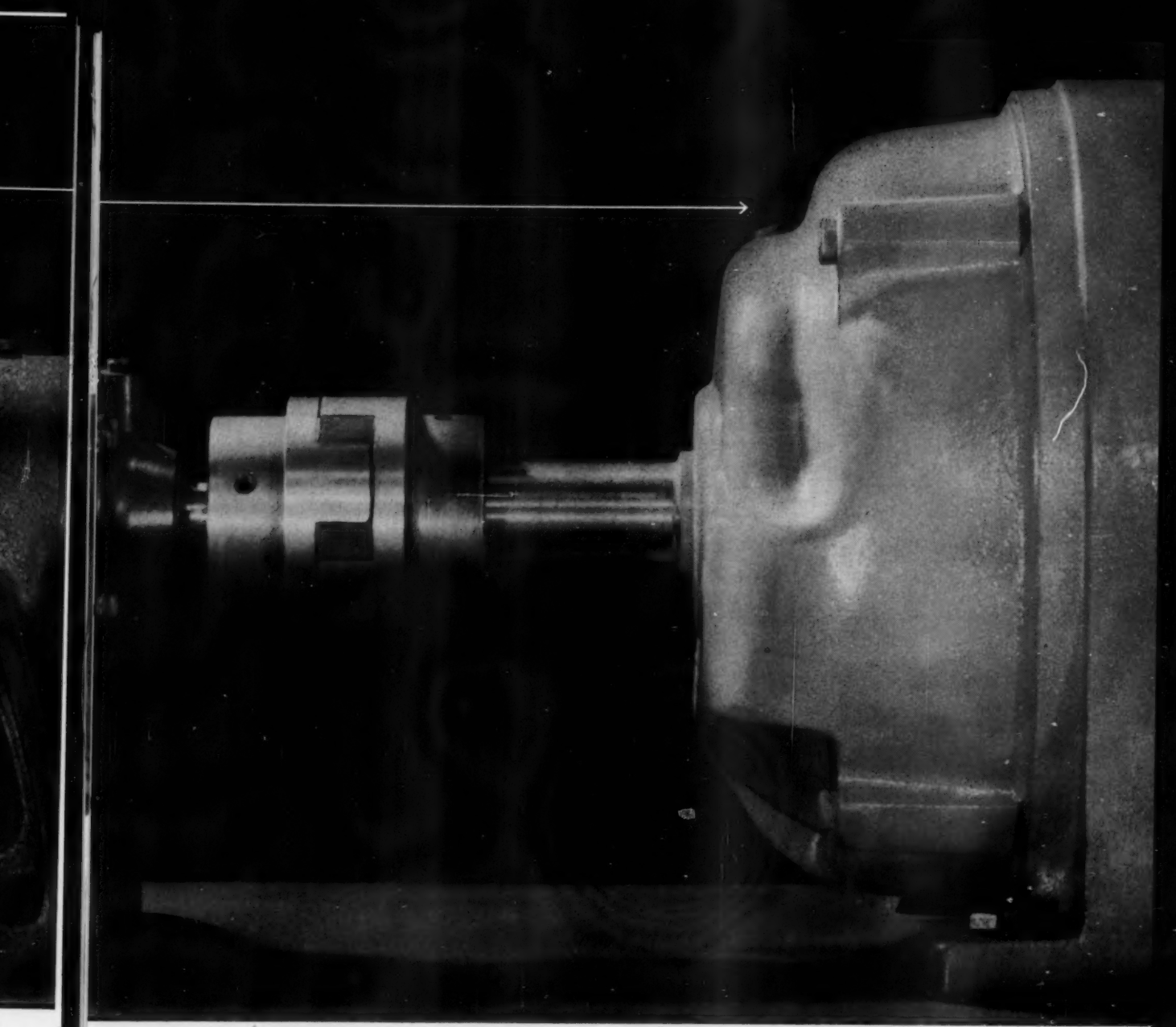
Chances are that Worthington's Standard End Suction Centrifugal (SESC) line will meet your strictest requirements for 49 out of every 50 jobs. Only once will you have to buy a non-standard pump.

"CUSTOM BUILD" AT NO EXTRA COST. An SESC pump gives you standardization *plus* versatility. You can literally "custom build" your pump to get exactly the right features.

For example, you have a choice of materials of construction—iron, steel, bronze, Worthite* and combinations of these—to meet all types of corrosive conditions.

Hydraulic coverage can't be matched. There are 120 different sizes with ratings up to 2,700 GPM and 550 ft. head. You have a choice of stuffing box or mechanical seal operation. Both open and enclosed impellers are available.

SLASH INVENTORY, REDUCE DOWNTIME. After you have installed an SESC pump, you reap the benefits of standardization. Since only four bearing frame sizes are used for the 120 pumps in the line, spare parts inventory can be cut as much as 50%. When repairs or conversions are necessary, parts interchangeability can often mean drastically reduced downtime. And since the entire line is built to the same basic design, maintenance work is greatly simplified and costs lowered.



49 TIMES OUT OF 50!

Your Worthington representative has a unique SESC Demonstrator that explains the many advantages of pump standardization. Ask him to show it to you, or write to Section SP-73 for Bulletin W-300-B4B. Worthington Corporation, Harrison, New Jersey.

*A high nickel, high-chromium, low-carbon alloy steel. Trademark Reg. U. S. Pat. Off.

WORTHINGTON

70,480 COMBINATIONS. *Worthington's SESC line offers you a broad selection of pump modifications to choose from. In all, there are more than 70,480 combinations...all built from standard, stocked parts and available for prompt delivery at competitive prices.*

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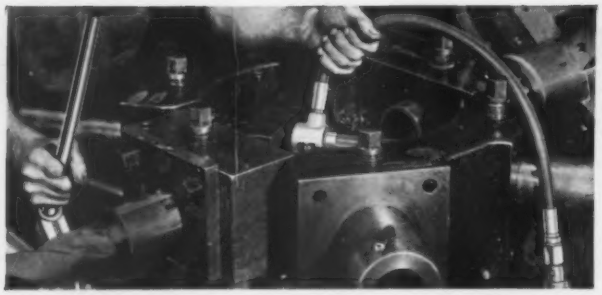
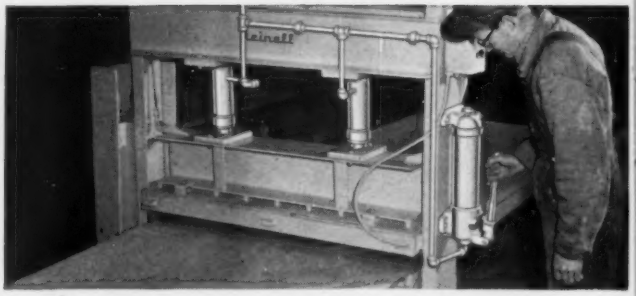
Slash maintenance costs..

Portable, easy-to-use BLACKHAWK hydraulic power tools do 1001 jobs, better, faster, safer...

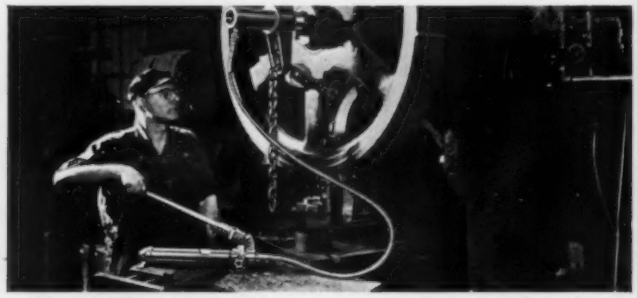


PUSH — For example, free tools from tight holders. Pushing here requires just a few strokes of the Porto-Power pump. Midget ram gets into small-clearance situations.



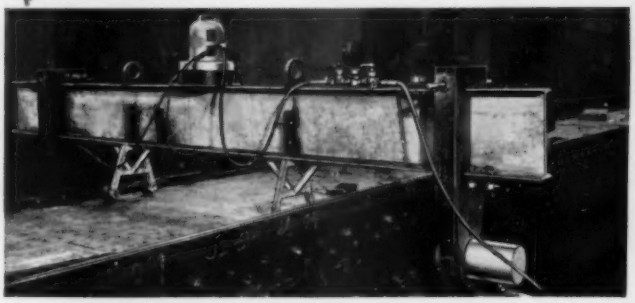
PRESS — Another low-cost, high-performance Porto-Power application—a pump and two rams apply 40 tons of pressure on this shop-built press.

SPREAD — For example die-sets, bent frames. A 2-ton Bantam Porto-Power with Toe-Lift is spreading a sticky die . . . saving valuable production time.



PULL gears, wheels. Just one man pulls flywheel on a large punch press with a 20-ton Porto-Power . . . with versatile attachments.

LIFT and level machinery. Porto-Power rams are all-directional. They can be used in any position. Here one is used to level a machine.



CLAMP — Blackhawk pumps, rams and valves hold 20-ton bridge section in place for welding and fitting — proof of Porto-Power's versatility.

. . . all over the plant !

Begin now...with BLACKHAWK general maintenance hydraulic tool assortment

Immediately make spectacular savings in manhours, materials! Drastically cut machine downtime with this Porto-Power FZ-15 master hydraulic tool set. It includes everything you need in pumps, rams and attachments to do a thorough cost-cutting job in every department of your plant. FZ-15 — only $347.50.

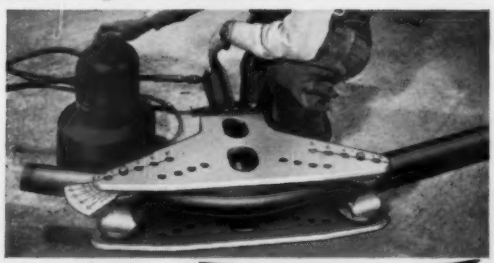
Rams of all types — 1½ to 50 tons

Money-saving Porto-Power applications are unlimited! These high-pressure rams are the low-cost answer for hydraulic jigs, fixtures, presses — and require minimum mounting space. Every ram in the complete Porto-Power line does a better job . . . because it's correctly designed for optimum range, capacity and lifting height according to its function.

Price subject to change without notice.

Save up to 75% on cost of manufactured bends with BLACKHAWK Electrically Powered Pipe Benders

You get terrific savings with new, featherweight Blackhawk Electrically Powered Pipe Benders for speedy bending of ½" to 4" rigid conduit and pipe. Make your own tailor-made, factory-like bends right on the job — offset, double offset and many others. Pays for itself in 35 bends! Call your electrical or industrial supply house today!



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New Porto-Power Hydraulic Rescue Kits save lives . . .protect property. Write for details.

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BLACKHAWK MFG. CO., DEPT. P-4937, MILWAUKEE 46, WISCONSIN

ACT NOW! SAVE NOW! CALL YOUR INDUSTRIAL SUPPLY HOUSE TODAY!

For more facts circle 540 on Reply Card

OPERATION AND PRODUCTION pointers for the industrial plant engineer

Edited by H. E. B. Anderson

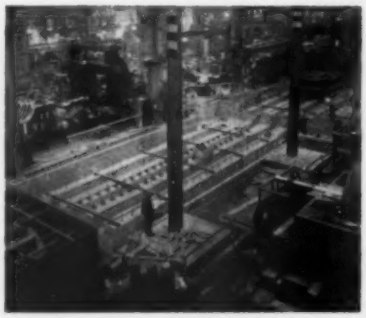
Silicones Waterproof Foundation

BUILDING 273, of the Schenectady Works of General Electric Co. is the workshop of the largest adjustable rail milling machine in the world. This huge machine tool, weighing over one million pounds, rests on a foundation containing more than one thousand yards of concrete, and some 40 tons of reinforced rod.

The foundation consists of a series of concrete piers that not only support the machine, but are designed to permit draining of the water soluble cutting oils used in the machine operations. A silicone solution, sodium methyl siliconate, was applied to the concrete foundation to protect it from damage by the cutting oils.

Application of the silicone solution to the pier and wall surfaces provides a water-repellent coating that facilitates use of the foundation area as a sump for the cutting oils.

The silicone used, SC-50, although water soluble, imparts water repellency to the surfaces on which it is applied. After application in aqueous solution, chemicals in the concrete and the surrounding air act as catalysts to speed up the chemical reaction that converts the solution into a water repellent.



Piers and walls of foundation were all coated with silicone, to repel water, oil

Expansion Shields—What and How

Contributed by Lyne S. Metcalfe

PRIOR TO THE expansion bolt, the general practice for fastening to masonry was to "punch" a hole in the masonry with a star drill, insert a stud or bolt into the hole, and pour hot sulfur or lead around it.

For making attachments to walls, the practice was to insert a piece of wood into a hole drilled into the wall, and fasten the load to the plug with a wood screw or nail. Changes in construction methods, that require fastening to hollow tile, plaster, plaster over lath, and dry wall construction have created new fastening problems.

According to C. H. Bunker, president of Diamond Expansion Bolt Co., Inc., the greatest problem in masonry attachment has been the hole, since the cost of drilling a hole has far exceeded the cost of any expansion shield. Development of anchors with smaller outside diameters and the carbide-tipped masonry drill have substantially reduced this cost, however.

An important factor, frequently overlooked, is that the holding power of an expansion bolt is increased as the depth of installation is increased. As shown in the drawing, deep anchoring is superior in holding power to shallow, since the deeper the hole, the greater the mass of concrete or masonry that must give way before the attachment will fail.

(Continued on page 62)

Stainless Steel Alloy Castings Revise Processes in Paper Making

STAINLESS STEEL, cast in a wide variety of components, will be prominent in a new $15½ million sulfate process tissue mill of the Hudson Pulp and Paper Co., being completed at Palatka, Florida. To achieve a daily output of 200 tons, the plant will use increased processing temperatures, pressures and severe corrosive solutions; thus stainless steel components were applicable.

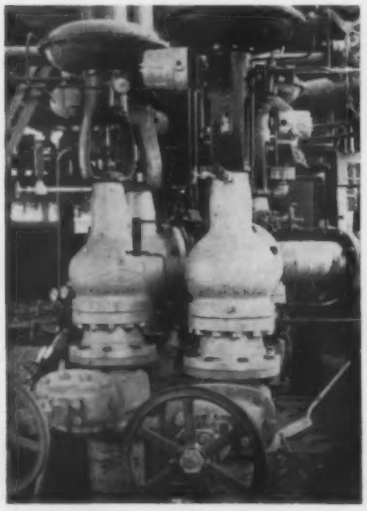


Fig. 1. Control valves, cast of stainless alloy, provide extended service life

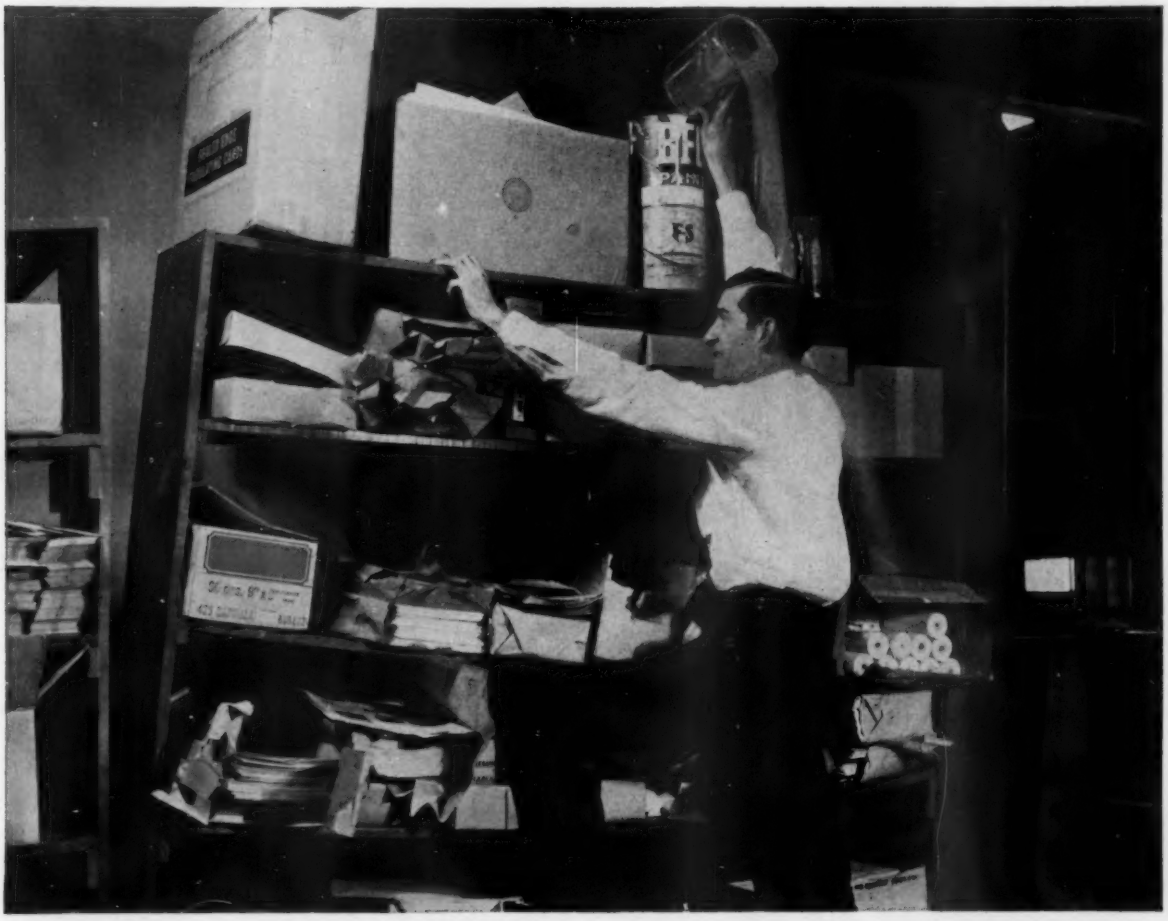
Fig. 2. Mixer for chlorine dioxide service with pulp is cast stainless alloy

Engineers for the new facility report that high alloy castings will be used in such units as fittings, control valves, heat exchangers, agitators, mixers and pumps. These components handle corrosive elements in the preparation of cooking liquors and in the various processes associated with the washing, purifying, bleaching, refining and paper-making phases.

One of the most widely-used alloys is type CF-8M (Alloy Casting Institute designation). Typical example is a 300-lb cast control valve used in digester fill service, two of which are shown in Fig. 1.

For a large number of applications, stainless alloys now allow use of processes that were not previously practical, such as the mixing of chlorine dioxide with the pulp in one of the bleaching stages. In the new plant, mixers for this service are made of high-molybdenum cast stainless alloy —where formerly glass-lined or similarly protected parts were necessary.

QUICK! *"Call the Deluxe Dealer— we have a shelving problem!"*



Exaggerated picture? Sure . . . but any one of these shelving problems may be troubling you . . . sagging shelves, insufficient storage space, inflexible wooden shelving, poor layout. To cure your shelving problems, call your Deluxe steel shelving dealer. He will engineer efficient and flexible shelving installations, then supply you with additional shelving racks as fast as you need them! Deluxe dealers are backed by the finest-designed and sturdiest shelving made.

These Deluxe features allow you to install Deluxe shelving at lowest cost.

1. One-piece bin type uprights—for greater rigidity, faster erection.
2. Boltless adjustable shelf brackets—complete adjustability without tools.
3. Snap-in dividers—for quick flexibility.
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5. Coped shelf corners increase storage capacity.

DELUXE
STEEL SHELVING

DELUXE METAL FURNITURE COMPANY · WARREN, PA.

A Division of the Royal Metal Manufacturing Company

Look for your Deluxe dealer under *Shelving* in the yellow pages of your telephone directory or write to the factory for the name of the dealer nearest you and the colorful "Shelving Reference Manual."

See us at Booth 1232 at the Materials Handling Show in Philadelphia.

For more facts circle 541 on Reply Card

OPERATION—PRODUCTION

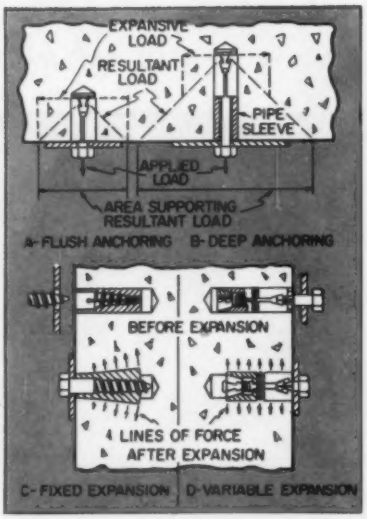
(O and P begins on page 60)

Expansion shields are of two general types—those with a fixed amount of expansion, and those with a variable amount. A good example of the former is the lag screw expansion shield. As shown in the drawing, the tapered lag screw, as it is turned into the shield, starts to expand it and creates the maximum expansion when the screw is all the way in. The size of the hole is critical, since too large a hole will not permit maximum expansion force, when the screw is tight.

The double machine bolt shield typifies the variable expansion type. It has a tapered nut on the inner end and a tapered cone on the outer end. After the bolt is turned all the way home, it begins to pull the shield forward against the tapered cone, expanding the front end of the shield and pulling the nut in at the back—thus setting up a parallel expansion which increases as the bolt is tightened.

Probably the most popular fastening device for hollow wall use is the toggle-bolt. A recent development in this fastener is a one-piece unit manufactured by Diamond. The triangular-shaped device, with a threaded inner end, is inserted into a ¼-in. hole, together with the bolt on which it is to be used. After it is in place, the bolt is turned in, opening the three legs of the shield until a pyramid is developed on the back side of the wall. The anchor cannot be expanded beyond the 'pyramid' point, and maximum structural strength is developed in the triple spring action.

While this fastener requires a small drilled hole, in most dry wall construction, only a screwdriver is necessary, since the hole can be reamed out with a nail after the initial puncture is made in the wallboard.



Top, comparison of shield lengths and strengths; bottom, two types of shields

Sweeping on Schedule

HIGH USE FACTOR is the policy at Pabst Brewing Company's Los Angeles brewery, when their power sweeper is involved. Six hours a day, Monday through Friday, the sweeper is in action, all around the plant.

The sweeper is used chiefly to clean the five acres of concrete and blacktop truck loading areas, rail sidings, parking lots, driveways and sidewalks surrounding the 11-acre plant.

At the loading docks, which stretch more than 100 yards along the side of the plant, the truck goes to work four or five times each day. The city sidewalks in front of the brewery are cleaned once daily, and the beer warehouse floor gets scrubbed once a month.

Four parking lots are cleaned once a month, and in between scheduled operations, the truck performs spot cleanup jobs behind maintenance and painting crews.

The sweeper, fitted with a side broom, was manufactured by the Wayne Manufacturing Co. With a sweeping swath 46 in. wide, its sweeping capacity is rated at 90,000 sq ft per hour.

Even maintenance of the sweeper is scheduled. Each Friday night, the unit is steam cleaned, lubricated and its

(Continued on page 64)

Plastic-Coated Thin Wall Conduit Holds Out Against Corrosive Paper Mill Fumes

PLASTIC-COATED, light wall welded steel conduit has outlasted heavy wall conduit ten to one in a highly corrosive atmosphere at the Charmin Paper Mills, Green Bay, Wisconsin. After six years of service, the conduit is in much the same condition as when originally installed.

Plastic-coated thin wall conduit installation at the control center in paper mill

Sulfurous acid fumes from wood chip digester retorts were badly corroding the heavy wall steel conduit to the extent that, in some areas, replacement was necessary every six months.

Since the original replacement took place—5000 ft of Dekoron-Coated E. M. T.—additional installations have been put in service. A total of approximately 50,000 ft of the tubing has been furnished by the Steel and Tubes Division of Republic Steel Corp.

The plastic-coated tubing was chosen for test when a stepped-up maintenance painting program for the heavy wall conduit failed.

The tubing now in use consists of a standard galvanized light wall welded steel tube, coated with a polyethylene armor. Simple compression couplings are adequate for jointing lengths of the tubing together—these are sealed by wrapping a double thickness of polyethylene or vinyl-backed insulating tape around the coupling.

Switch to sludge-free Purex Salt

In every 100 lbs. of rock salt you buy you assume the risk of paying for up to 5 lbs. of insolubles or sludge—shale and sulphates. This means that in a 50-ton carload of rock salt you may pay for as much as 5,000 lbs. of sludge! This insoluble matter is included in the purchase price of the rock salt and accounts for part of your freight bill. It also necessitates periodic cleaning out of your brine making system.

But when you buy Morton Purex Salt, you get high-purity evaporated salt that is made in a controlled particle size to prevent packing and channeling. With Purex, none of your purchase price or freight bill goes toward paying for insolubles or sludge.

With Purex, no time or labor is wasted in cleaning out insoluble matter from your brine making system to keep it functioning at peak capacity. For Purex is 100% soluble. Morton Purex Salt will leave no accumulation of material in either the brine or water softener tanks. It can be used in bulk wet storage systems and in the Morton Model E Brinemaker.

These filter pads (approximately 1/5 actual size) show you how much insoluble matter (sludge) you get in just 5 lbs. of various kinds of salt.

Southern Rock Salt | Northern Rock Salt

Kansas Rock Salt | Morton Purex Evaporated Salt

Tests for insolubles taken from these random samples show you that Morton Purex is the only one that contains no wasteful sludge, or insolubles.

For more information about Morton Purex Salt and for free, expert help on any water softening or brine making problem, write or wire:

MORTON SALT COMPANY
INDUSTRIAL DIVISION
Dept. PE-3, 120 So. LaSalle Street,
Chicago 3, Illinois

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can be tested
...and tests prove
Westinghouse AB breakers
protect at the precise rating
you need

breaker protection is *sure* and *accurate*

YOU CAN BE SURE... IF IT'S Westinghouse

J-90232A

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OPERATION—PRODUCTION

(O and P begins on page 60)

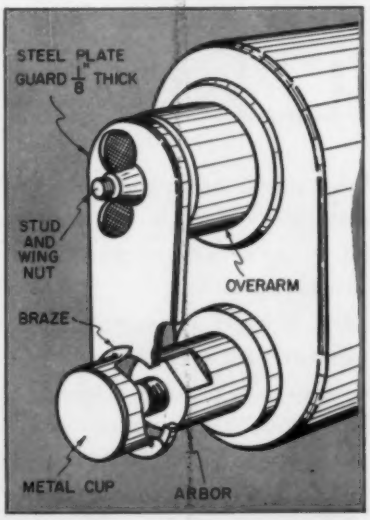
Power sweeper in action on one of numerous areas which it keeps clean

filter is washed down. As a result of following this procedure, downtime on the sweeper has been negligible, according to Pabst personnel.

Milling Machine Arbor Guard

Contributed by F. E. Riley

POTENTIALLY DANGEROUS, on the average milling machine, is the end of the arbor, which protrudes from the front of the arbor support bracket. Although the nut on the arbor has a



Cutaway view of guard in position shows attachment of plate to overarm

smooth exterior, with one pair of spanner flats, the thread end can prove to be dangerous, especially at high speeds.

The threaded end of the arbor can pick up loose clothing, cause cuts and scratches on the operator's hands and

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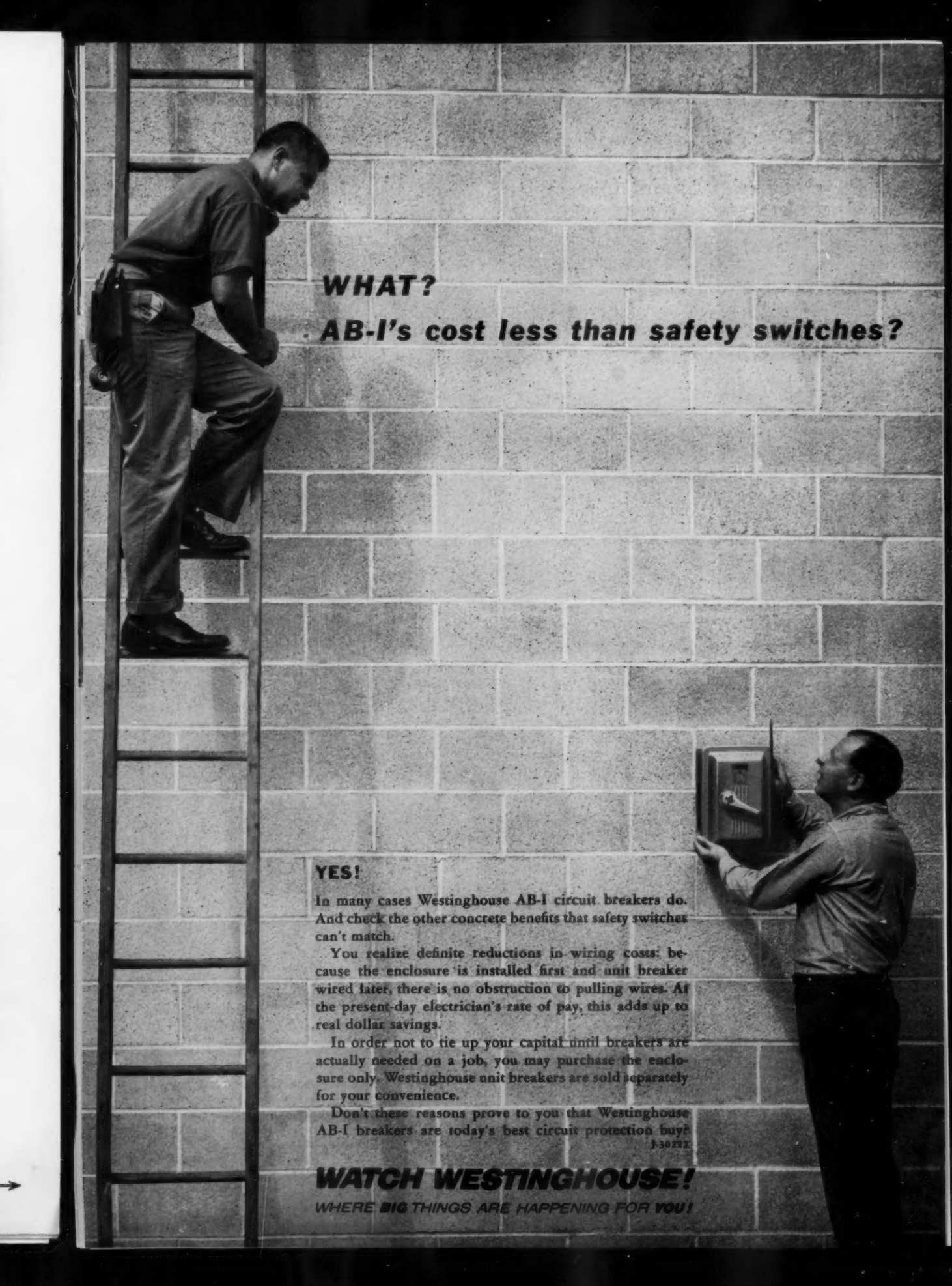
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AB-I's cost less than safety switches?
YES!
In many cases Westinghouse AB-I circuit breakers do. And check the other concrete benefits that safety switches can't match.
You realize definite reductions in wiring costs: because the enclosure is installed first and unit breaker wired later, there is no obstruction to pulling wires. At the present-day electrician's rate of pay, this adds up to real dollar savings.
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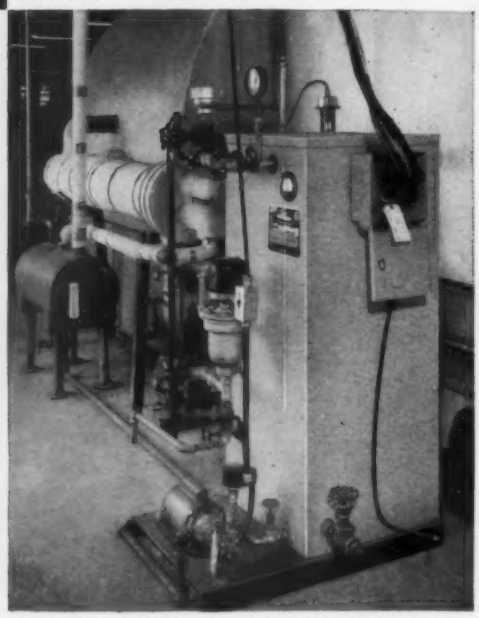
WHERE BIG THINGS ARE HAPPENING FOR YOU!

Pantex
Speedylectric Steam Generator

Ideal Steam Source for Production Processes



Speedylectric Steam Generator supplying heat to waxer.

Manufacturing huge quantities of waxed paper containers of every size and shape, a nationally-known company needed a reliable source of heat for a production step in which the new containers are deeply impregnated with a special hot wax. Here, as in many manufacturing processes, a Pantex Speedylectric Steam Generator was the answer.

In the impregnation process, accurate control of wax temperature and submersion time is required for dimensional control of the finished product, complete wax penetration and stability of ink colors. The use of a Speedylectric Steam Generator as a heat source not only assures reliable temperature control at modest cost, but eliminates all danger of fire or explosion . . . serious hazards where the plant atmosphere is often full of particles of waxed paper.

Wherever a reliable, convenient, safe source of steam is needed, Speedylectric Steam Generators serve industry. Using a unique electrode method to generate steam, and easily portable, they require no supervision, operate without flame or fumes, and eliminate the risk of fire or explosion.

WRITE TODAY FOR COMPLETE FACTS AND FIGURES

Speedylectric Steam Jet Cleaners, too, serve industry in countless ways. High pressure jet of dry steam and solvents quickly removes grease and dirt accumulations from machines and equipment without flooding floors. No need to stop nearby production or move machines outside. Completely safe and portable.

PANTEX MANUFACTURING CORPORATION
Box 660AH, Pawtucket 3, R. I.
Send me facts and figures on:
☐ Pantex Speedylectric Steam Generators
☐ Pantex Speedylectric Steam-Jet Cleaners

Name and Title.....
Company.....
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OPERATION — PRODUCTION

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can be a hazard when the operator bends down to check cutting action.

A simple guard, easily removed and replaced, which does not impede the running of the machine, is illustrated. It consists of a steel plate, shaped and rounded, and fitted with a sheet metal cup that is brazed or welded to the plate. The cup encloses the end of the arbor, including the threaded end.

The guard is secured at the top to the end face of the overarm, which is drilled and tapped to receive a stud. A wing nut on this stud holds the guard in place.

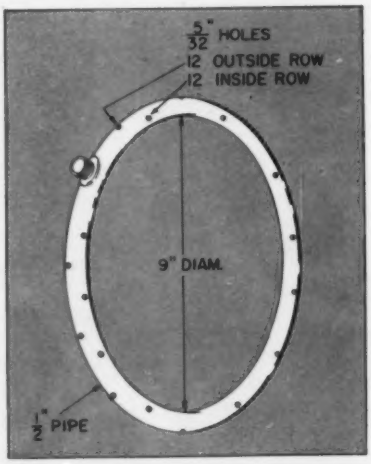
On milling machines having twin overarms, the same type of guard can be used. In this case, however, two wing nuts are used—one for each overarm—and the steel plate is a triangle with a wing nut at two of the corners, and the cup at the third.

No-Draft Air Cooling

Contributed by R. L. Meinecke
Allis-Chalmers Mfg. Co.

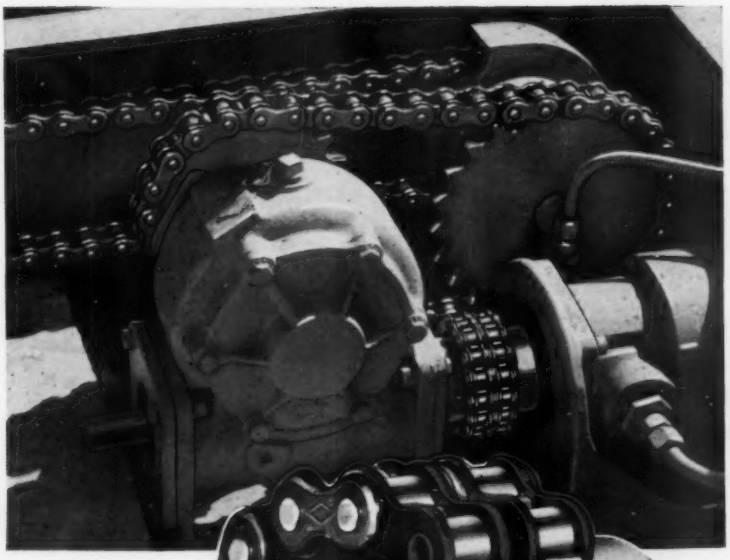
RAPID AND UNIFORM cooling of shafting is provided by a "soft" air cooler fabricated from ½-in. brass pipe and an air hose connector.

More effective than an air hose, the soft air cooler is used in shaft assembly work to prevent pulling when shrink fits are made. The cooler has a 9-in. inside diameter and is drilled with 24 5/32-in. holes. Twelve of these holes are in each of two rows, drilled at 90 degrees to one another around the periphery of the cooler.



Brass piping loop, drilled as shown, becomes soft air cooler for metal shafts

Before assembly of a shaft with its



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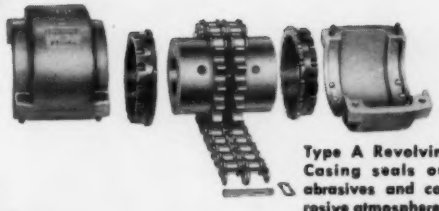

Type A Revolving Casing seals out abrasives and corrosive atmospheres, seals in lubricant for extended coupling life.

End to end shaft connections can be made quickly, inexpensively and in minimum space with Diamond Flexible Couplings. Load is carried at the greatest radius and distributed evenly over the entire length of chain for maximum capacity and life. Moderate angular and parallel misalignment as well as shaft end float are absorbed in the clearances between chain and sprocket teeth.

You probably have many applications for Diamond Flexible Couplings. Call your nearest Diamond Distributor for immediate service. His name is in the yellow pages of the telephone book under the heading Chains or Chains-Roller.

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DIAMOND ROLLER CHAINS

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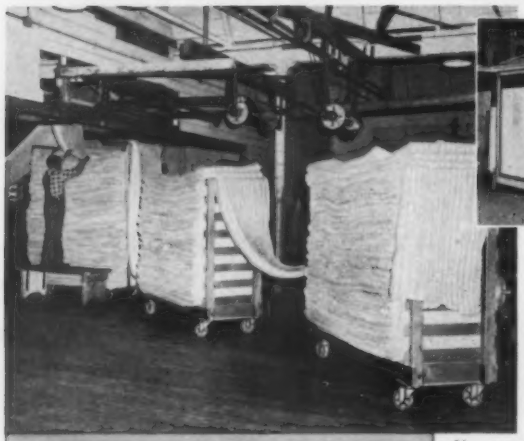
NOBLITT-SPARKS
Faultless CASTER
MATERIALS HANDLING FACTS

HOW 2 HANDLING OPERATIONS OF BULKY PRODUCTS WERE ELIMINATED BY NATL. AUTOMOTIVE FIBRES



Using but two styles of manually operated floor trucks, a completely integrated materials handling system is maintained at National Automotive Fibres, the world's largest independent manufacturer of automotive interior trim. Long streamers of processed cotton, used for padding automotive seat cushions, are lapped several feet deep on wooden "cattle-car" type castered trucks, which are ideally suited for this application. The padding material is then moved on the trucks to a station for the application of glue and a covering fabric. These inexpensive trucks, equipped with ball bearing swivel Faultless 606-6 Casters, solved the problem of handling a bulky product easily and economically. Partitioned floor trucks serve as the second prime materials handling method for this large manufacturer. These partitioned trucks serve both as a fast and convenient way of moving bulky fabrics, pressboard forms and assorted trim materials between manufacturing operations and as temporary storage units for the same materials. As a result *at least two expensive handling operations are completely omitted;* eliminating the unloading of materials from trucks to shelves and back onto trucks when material is needed. Since these operations are eliminated several times daily, the yearly savings are an important achievement.

There are Faultless Engineered Casters made for every conceivable handling and equipment use, whether requirements call for handling of 7 pounds or 7 tons, indoors or outside applications, or use on office chairs or jet engine stands.

For latest Caster information, call your Faultless distributor, listed in your phone directory. He can give you delivery from stocks.

600 SERIES DOUBLE BALL BEARING SWIVEL PLATE CASTER

Two full rows of ground polished and hardened ball bearings roll freely in two complete, hardened raceways for maximum maneuverability. King bolt nut is threaded for fine precision adjustment of raceways.

Illustration of top plate locking lugs shows how the lower ball race is positively anchored and locked to the top plate, giving full-floating freedom to the horn in swiveling between the two ball races. An exclusive Faultless feature.

Series 600 Faultless Casters are made of a special high tensile alloy material having extreme strength and high ductility to withstand shocks imposed upon it. Yet the material is hard enough to resist indentations from the ball bearings.

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For more facts circle 547 on Reply Card

OPERATION—PRODUCTION

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moving parts, some of the parts are heated to 500 F, to expand them for easy fit on the shaft. After the pieces are assembled on the shaft, the soft air cooler is used to spread the cooling. It has been found to all but eliminate the distortion that occurred when an air hose was used, directing a blast of air at spots of the assembly.

Modernizing With Motors

Contributed by Francis A. Westbrook

AT ITS MILL in Crowley, La., Louisiana Rice Growers, Inc. has modernized its machine drives with good results, following the installation of a Coppus steam turbine. The turbine drives a 250-kva, 220-v, 60 cycle, 3-phase generator that provides power for individual drives of several machines formerly driven by a line shaft.

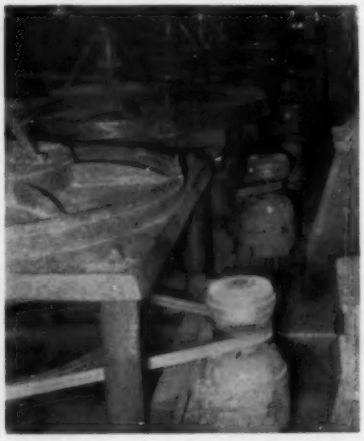


Fig. 1. Vertically-mounted motors drive stones through fluid couplings, v-belts

All the stones used for removing the hulls from the rice are now driven individually by 5-hp, 1800-rpm motors through fluid couplings and steel cable V-belts. These couplings enable motors of normal torque to start the heavy stone discs without difficulty. Since the stone shafts are vertical, the motors are mounted vertically.

Roller bearings are being installed on the under-running stone shafts, whenever it becomes necessary to dismantle them for resurfacing.

Paddy machines, which separate hulled from unhulled rice, have also been converted to individual drive. Each 5-hp, 1200-rpm motor is mounted on a sliding base and is equipped with a variable speed pulley designed to

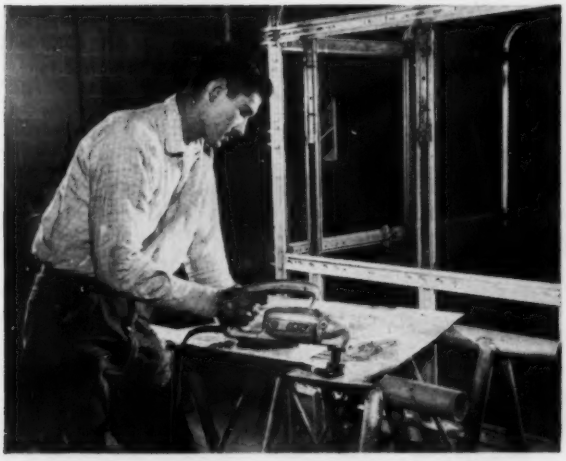
Saves $100 per unit

Griffin Tank and Welding Service of Dallas, Texas, custom builds geographic photographic equipment. This equipment must be lightproof, weatherproof, dustproof and air tight. "When SKIL drivers were substituted for hand tools for fastening, we saved over $100.00 per unit, and quality improved tremendously," says C. B. Jones, Chief Engineer.

Saves one operator

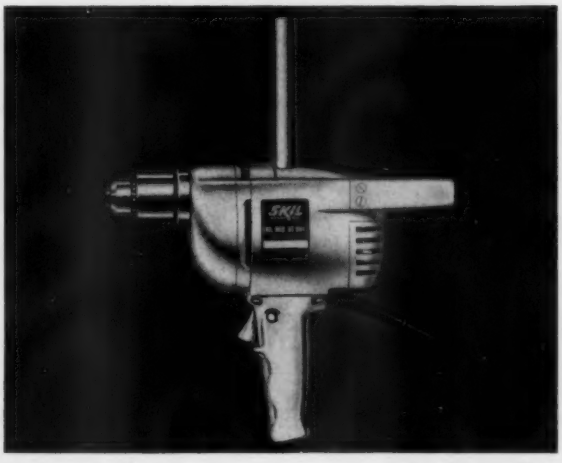
At Mercury Engineering Company, Milwaukee, Wisconsin, two men formerly handled the job above—drilling a 1⅛" hole in 16" steel. Then a SKIL Model 163 was tried. Now, one man not only drills, he also reams, taps and hones. "We always had good experience with all models of SKIL drills," says Ted Curtis of Mercury.

Metalworkers SAVE with SKIL tools



Saves $100 per week

"Our new SKIL Shear paid for itself in the first week," says J. M. McLain, owner of J. M. McLain & Sons Trailer Company, Houston, Texas. "In using other makes of shears we found that maintenance costs were about to run us out of business. Some operations were cut from 30 minutes to 1½ minutes. My men like SKIL shears because they are adaptable."



Save with New ½" Model 80 Drill

All-new design: shorter, narrower—one pound lighter! New power for fast drilling on the toughest jobs. No matter what you have to drill, cut, sand or grind, there's a SKIL tool to do the job faster, better, cheaper. Let your SKIL distributor show you why. Let him show you the speed, power, versatility and ease of handling of all SKIL power tools.

Write SKIL direct for free literature and the name of your nearest distributor.

Made only by SKIL Corporation, 5033 Elston Avenue, Chicago 30, Illinois. In Canada: 3601 Dundas Street West, Toronto 9, Ontario. Factory branches in all leading cities.

SKIL PORTABLE TOOLS

For more facts circle 548 on Reply Card

New QUAKER hose for hot air ducting cuts heat loss up to 57%

Synthetic fabric jacket and silicone tube retain temperatures from upstream to downstream end

Made in continuous lengths up to 50′, this new Quaker hose easily withstands temperatures as high as +450°F; as low as −80°F.

As the above diagram shows, the hose keeps heat loss—and therefore energy loss—to a minimum. (Comparable outside temperature of ordinary hot air ducting material, such as stainless steel, would be about 400° F.). Both the silicone tube and the synthetic fabric jacket of Quaker's new hose hold the heat!

Other advantages? The hose is lightweight and fully flexible. And it resists abrasion.

Available in either single or double jacket, the hose comes in 1″ to 4″ I.D.'s. Sizes 1″ and 1¼″ I.D. can be made in 30′ continuous lengths; 1½″ to 4″ I.D. in 50′ lengths. The hose takes regular expansion and shank hose couplings.

Want more information? Write to: *H. K. Porter Company, Inc. Quaker Rubber Division, Philadelphia 24, Pa. or Quaker Pioneer Rubber Division, Pittsburg, Cal.*

HKP

QUAKER RUBBER DIVISION
QUAKER PIONEER RUBBER DIVISION
H. K. PORTER COMPANY, INC.

For more facts circle 549 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 60)

Fig. 2. Adjustable-speed pulley, countershaft drive paddy machine flywheel

give speeds ranging between 85 and 230 rpm.

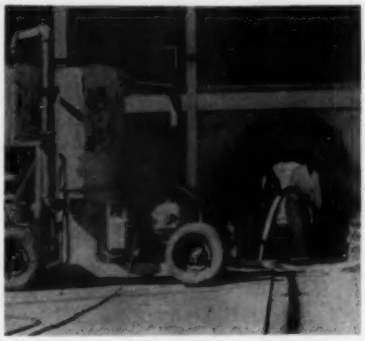
The main drive is from the motor pulley to a countershaft, then from the countershaft through a multiple-link V-belt to the paddy machine flywheel.

Tough Job, Tough Hose

CLEANING a kiln area of hot brick chips and sand, at about 150 F is a difficult job. However, the Acme Brick Co., Bennett, Texas, has found a method that is working efficiently.

Cleaning equipment is a 15-hp Spencer portable vacuum cleaner equipped with a specially-lined rubber hose developed by B. F. Goodrich. The hose readily withstands the heat and abrasive action of the materials being picked up by the vacuum cleaner.

Because of the size of particles being handled, no nozzle is used on the end of the hose; the hose is run directly on the floor.



Operator guides vacuum cleaner hose around kiln in brick, chip cleanup

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Whatever the LIGHTING PROBLEM in front of you...

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Superior Solutions to lighting problems require the *precisely right lighting system* for the seeing task and environment, plus *quality lighting units* built to deliver this lighting at lowest-per-year cost. With Benjamin you get both.

You get the precisely right lighting system, because Benjamin's line is so complete that thousands of different lighting systems can be created from it. You get lowest-per-year cost, because every Benjamin Unit has the quality and durability which 50 years of experience has proved to be essential.

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5. "Magna-Flo" w/27° Lamp Shielding
6. "RLM Dome" Reflectors
7. "Magna-Flo" w/Plastic Covers
8. "Elliptical Angle" Reflectors
9. "Steelite" Armor-Clad Units
10. "Magna-Flo" Individual Units
11. "Symmetrical Angle" Units
12. VOUL Units w/25% Uplight
13. All-white "Diffuser" Reflectors
14. "Sky-Glo" Translucent Ceilings
15. "Stock-Bin-Lite"
16. "Officer" Louvered Units
17. "Panel-Glo" Plastic Ceilings
18. "Varsity" Low-Cost Fluorescent
19. "RD" Projectors
20. "Vapolets" Vapor-Tight Units
21. "Duo-Service" Floodlights

These and many other Benjamin Lighting Units form the basis for thousands of different industrial lighting systems.

Certified Lighting for a Better America

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Sold Exclusively through Electrical Distributors

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use steam efficiently, economically—choose the trap with . . .

just one moving part

. . . for easy maintenance

After all, a steam trap *should* be simple. Its job of discharging condensate and air from steam lines and equipment, is a simple one. But its importance shouldn't be overlooked. On its effectiveness can rest your economical use of steam . . . the efficiency of your process operations.

With Nicholson steam traps there's just one moving part. Nothing to go wrong. But with all their simplicity, Nicholson traps have the greatest capacity of any trap their size. Plenty of other important features, too, and it'll be well worth your while to check them.

- **Powerful valve action**
- **Tight, positive shutoff**
- **No dribbling, no steam waste**
- **Each unit service tested**

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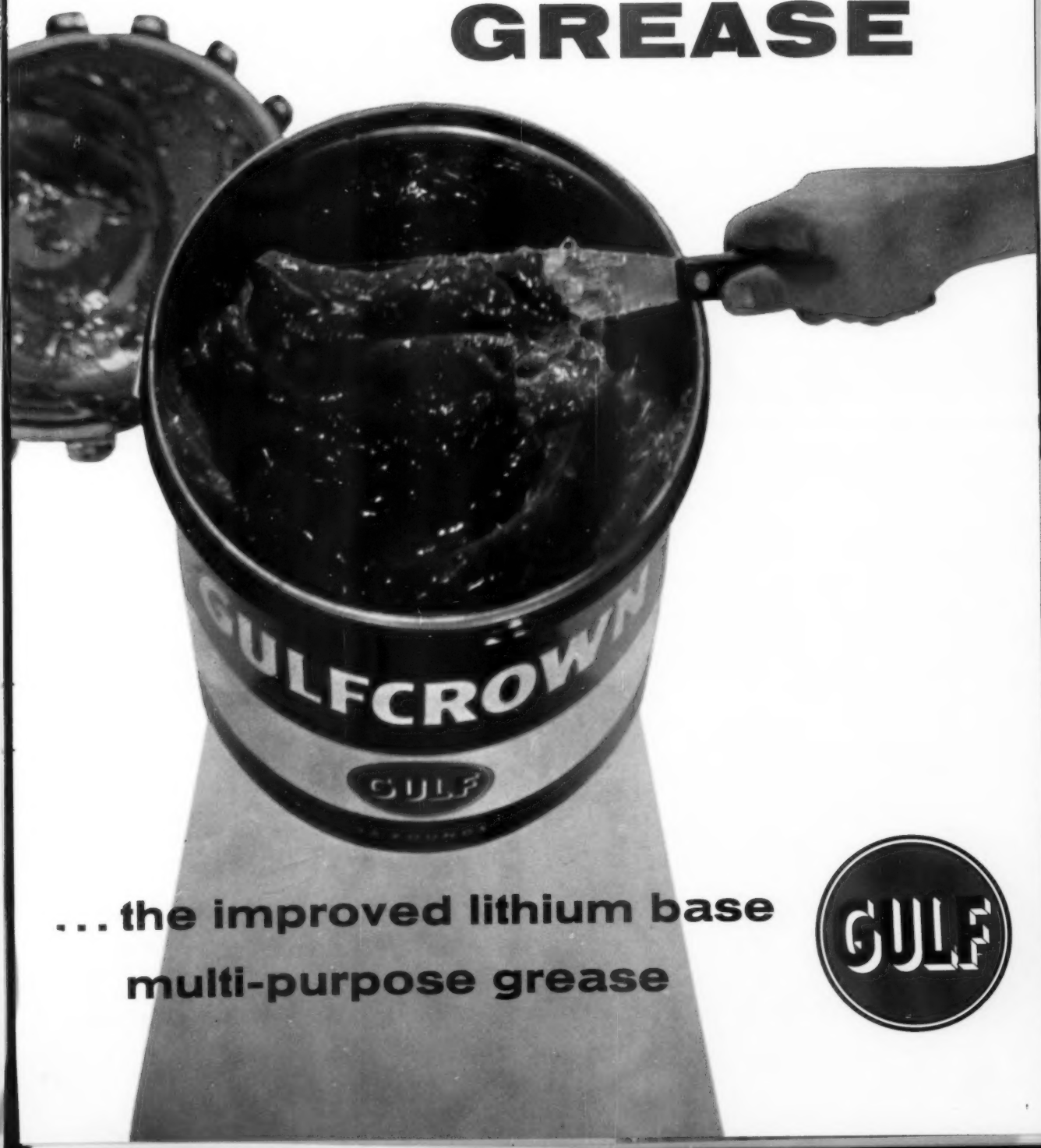
NEW GULFCROWN GREASE



... the improved lithium base multi-purpose grease

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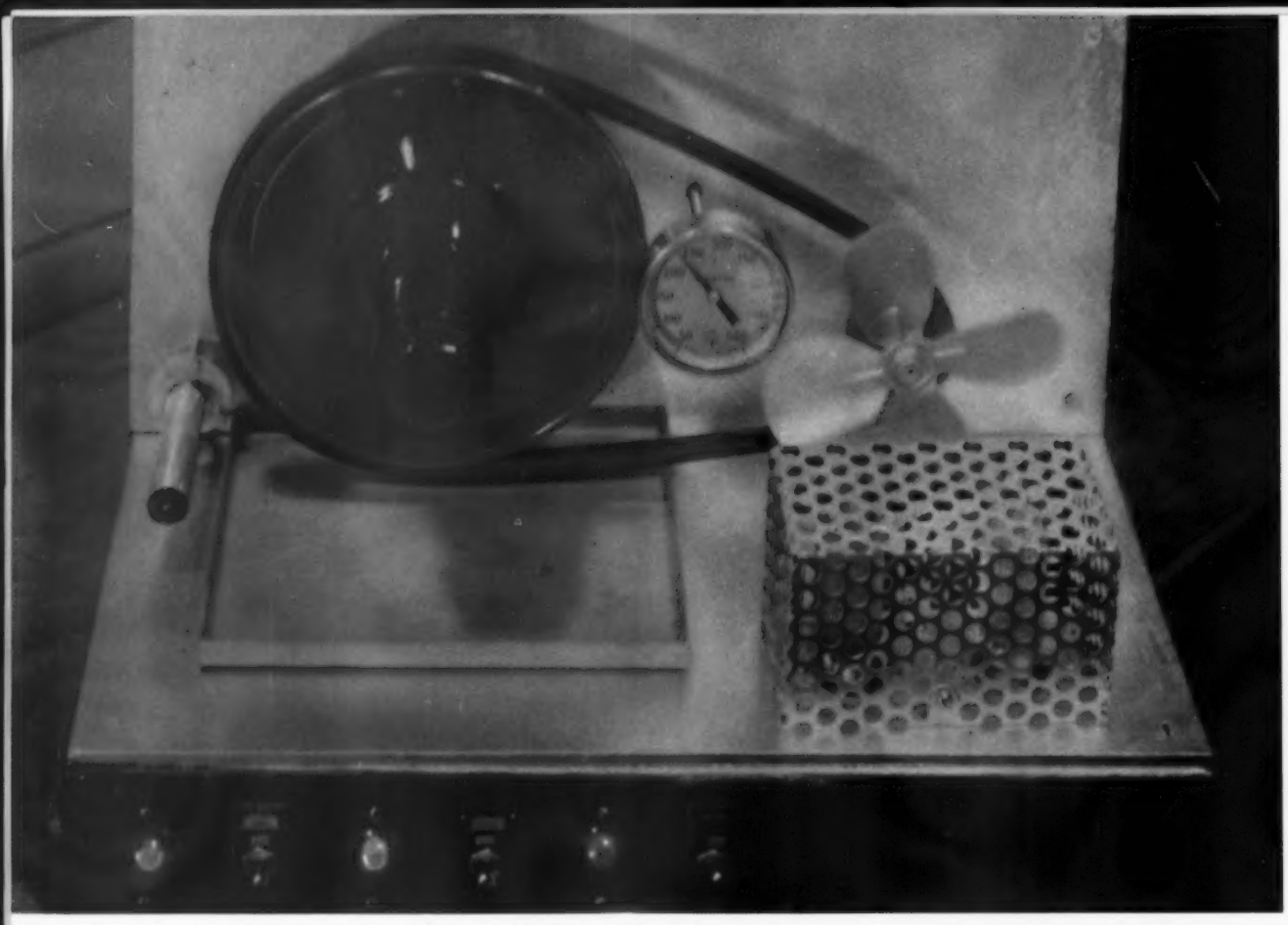


NEW

GULFCROWN

...the one grease that does the work of many

- Simplifies application and avoids errors
- Reduces inventory
- Cuts lubrication costs

This bearing packed with Gulfcrown Grease was run at 750 rpm in a special oven heated to 250°F. Gulfcrown "stays put" . . . doesn't run out even after thousands of hours at high operating temperatures. And the bearing remains in brand-new condition.

Samples of Gulfcrown (shown on 4 steel plates) are sprayed with water heated to 130°F. Note how Gulfcrown adheres, doesn't wash away.

Excellent oxidation stability

Gulfcrown is effectively inhibited against oxidation to insure long life, both in storage and in use.

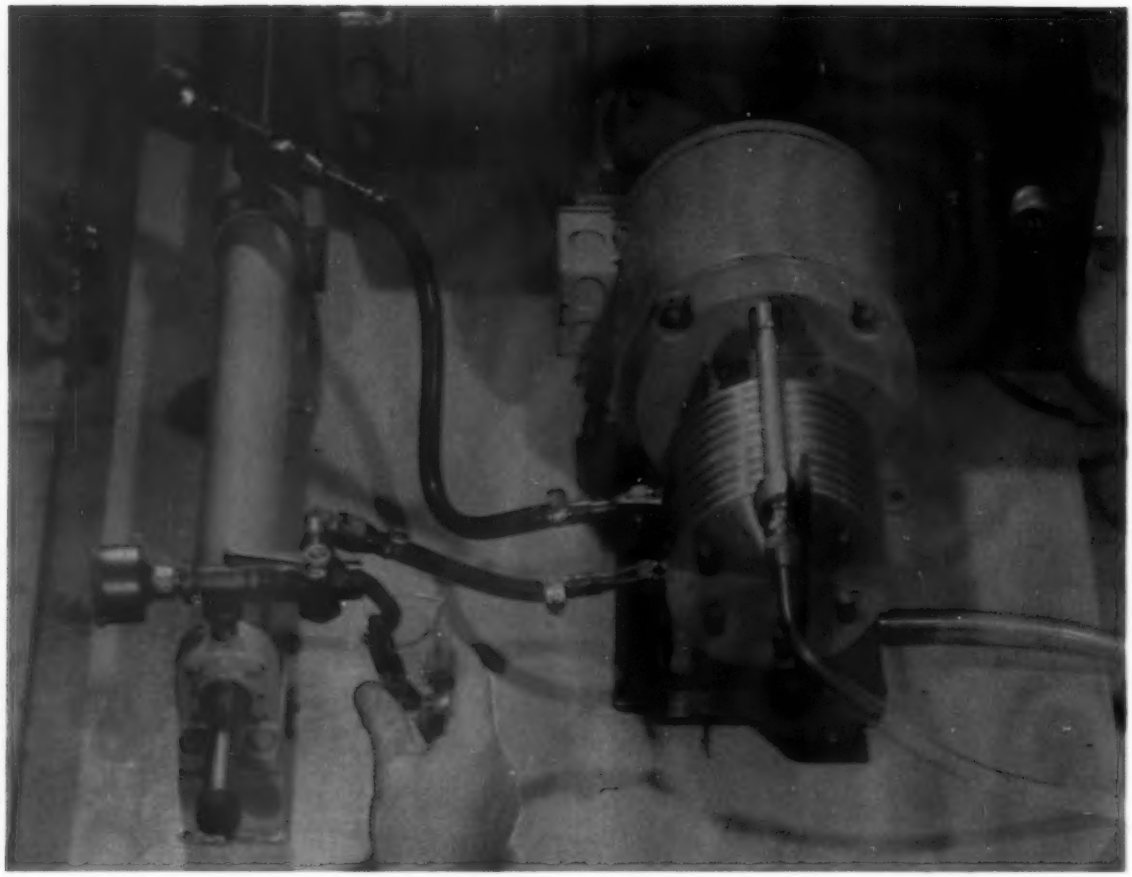
Unsurpassed working stability

Gulfcrown Grease stands up under the churning action of high-speed bearings even at high temperatures. This means less grease consumption, less frequent applications. It is ideal for centralized grease systems—it pumps easily and will not separate.

Resists water

Gulfcrown Grease is highly resistant to the washing action of water. It provides excellent lubrication and protects against rusting even under the dampest conditions.

Gulfcrown Grease pumps easily even in coldest weather. Temperature in this freezer chest is 0°F.



This grease stability testing machine, developed at the Gulf Research Laboratory, provides additional evidence of the mechanical stability of Gulfcrown Grease. Gulfcrown does not break down in consistency even after being pumped through a bearing operating at 1725 rpm.

Gulfcrown is available in 4 consistencies. Your Gulf Sales Engineer will gladly help you make proper selection. Call him at your nearest Gulf office . . . or use the coupon below.

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☐ Please send me free literature on new Gulfcrown.
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SP-8916

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LYON benches have amazing strength and rigidity through 3 design features: (1) All-welded construction. (2) Legs and cross members of heavy rolled "T" shapes. (3) Bottom-flared legs.

STEEL WORK BENCHES, for example. At a glance all work benches may look alike but there's a world of difference—in strength, rigidity, stability and smoothness of working surfaces. That's why you should check Lyon before you buy.

This same quality design makes the difference in every one of the more than 1500 standard Lyon items, a few of which are shown below.

CALL YOUR LYON DEALER. He offers the world's most diversified line of steel equipment. Equally important, he can show you how to get the most for your money in terms of saved time and space.

We can manufacture special items to your specifications.

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Factories in Aurora, Ill. and York, Pa.
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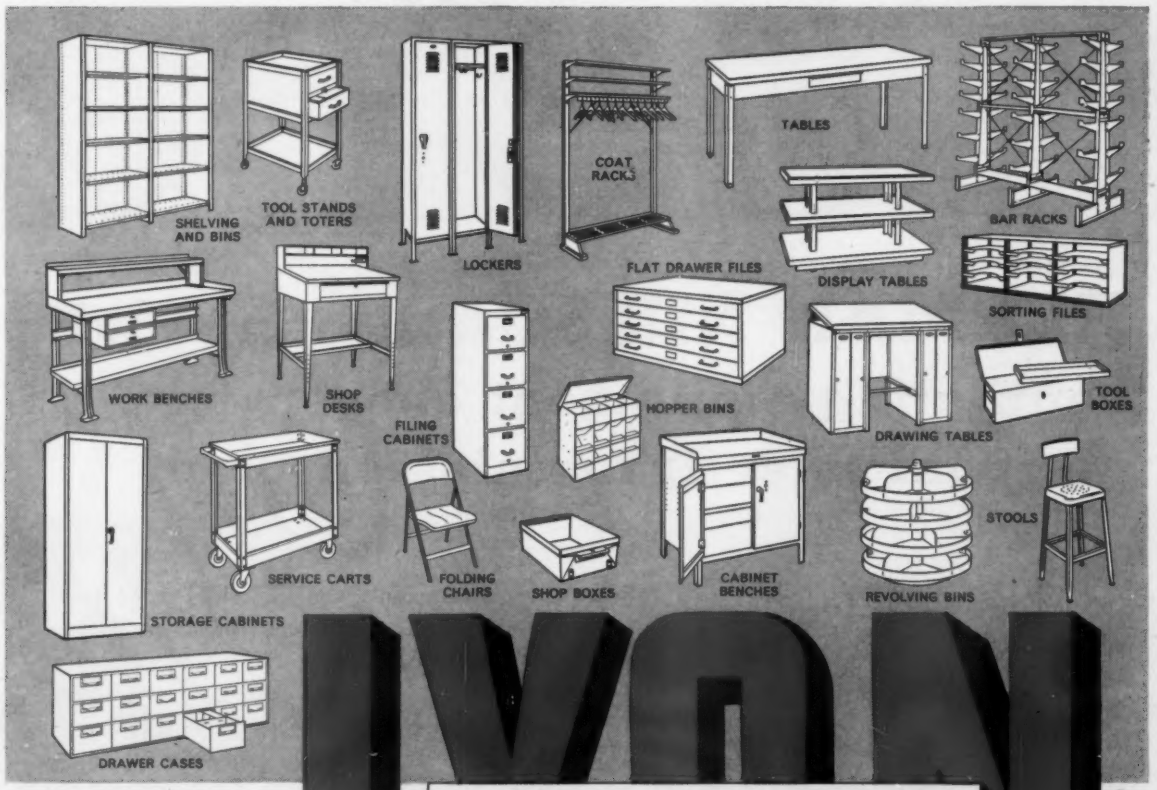

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STEEL EQUIPMENT

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SP-8916

1. SIX HERMAN NELSON HEATING AND VENTILATING UNITS blanket the Chrysler Corporation's Transmission Plant shipping department doorways. Suspended from the ceiling, they hang out of the way . . . provide quiet operation. Available in heat capacities ranging to one million BTU's.

Architects and Engineers:
ALBERT KAHN ASSOCIATED ARCHITECTS & ENGINEERS, INC.
Detroit, Michigan

Mechanical Contractor:
FREYN BROS., INC.
Indianapolis, Indiana

HERMAN NELSON heating and ventilating equipment chosen for new Chrysler transmission plant

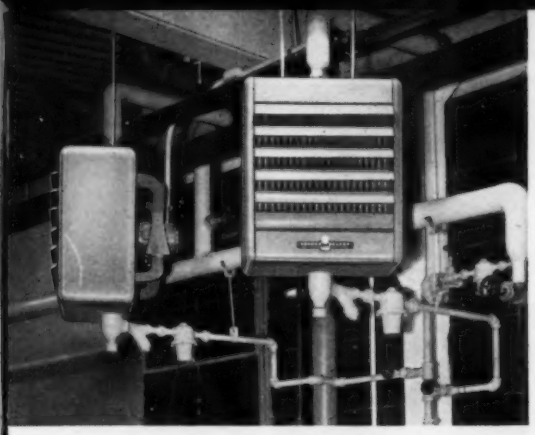
Complete Herman Nelson line . . . at work in Kokomo:

Heating and Ventilating Units
Unit Blowers
Vertical Unit Heaters
Horizontal Unit Heaters
Centrifugal Fans
Exhausters

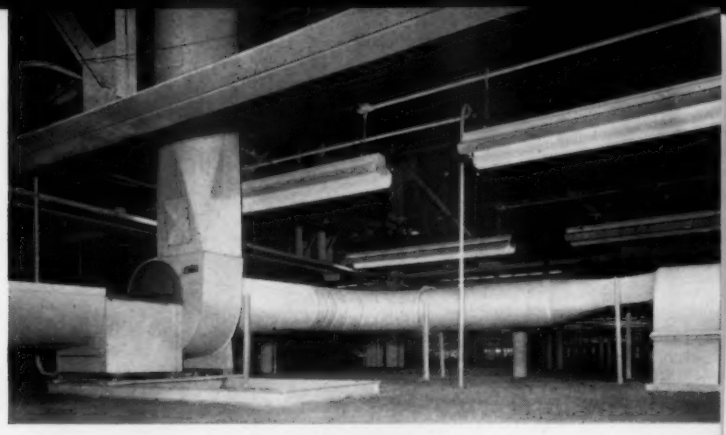
plus AAF Air Filters and Dust Collectors, and Illinois Engineering Steam Specialties

When Chrysler Corporation planned its huge new automatic transmission plant at Kokomo, Indiana, it made certain that all departments would be properly heated and ventilated—and in the most efficient way possible. Selection of Herman Nelson equipment on such a plant-wide scale demonstrated Chrysler's confidence in Herman Nelson.

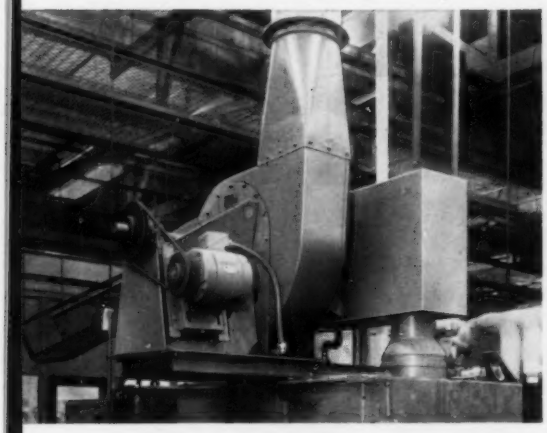
If yours is a problem requiring better air, remember . . . *better air is our business.* You can *depend upon* the quality, performance and efficiency of this *complete* line of air handling equipment. Call on our nation-wide sales and service organization for any help you need.



2. A PAIR OF HERMAN NELSON HORIZONTAL UNIT HEATERS blanket a window area in the penthouse storage area at the Kokomo, Indiana, plant. Using either steam or hot water, compact in design, these heaters are available in 18 sizes.



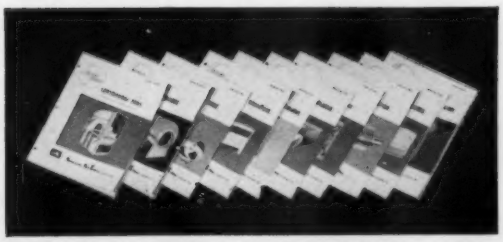
3. HERMAN NELSON UNIT BLOWER used for exhausting the manufacturing area. A completely "packaged" blower, easy to install, the unit features a hinged drive-side cover and outboard sheave that permits complete, easy-to-get-at servicing of belt and motor.



4. A NEW AAF TYPE K INDUSTRIAL EXHAUSTER provides high efficiency in various heat treating operations at the Kokomo plant. Exclusive Taper Lock Hub Assembly on this completely "packaged" unit allows fast, easy changeover on heavy-duty applications where periodic wheel replacement is anticipated. Eliminates the problem of impellers freezing to shafts.

5. HERMAN NELSON CENTRIFUGAL FAN supplying filtered and heated air to main factory area (hot blast system) at the Chrysler plant. AAF air filters and Illinois Engineering steam traps in system were included in this installation. The smaller unit in illustration is a Herman Nelson Unit Blower Size BBZK-1800, exhausting toilet space in penthouse.

6. A HERMAN NELSON VERTICAL UNIT HEATER with louver diffuser discharges air vertically downward or at angle in various directions. Located in the main factory area, it is high on the ceiling, out of the way, yet directing warm air, without drafts, wherever it is needed.



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GENERAL CABLE

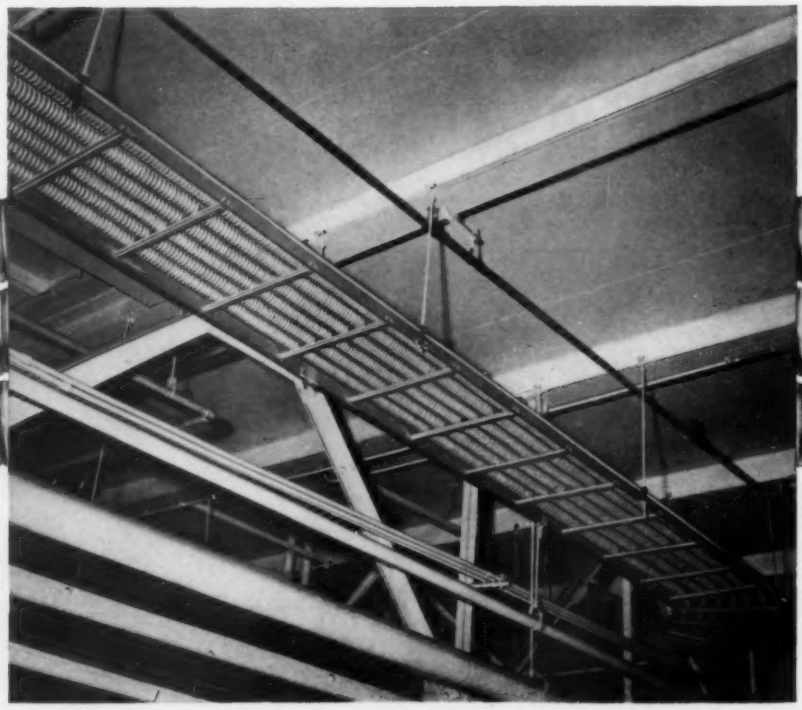
Interlocking Armored Cable

Interlocking Armored Cable provides savings in material, reduces space requirements and saves on installation costs as compared to wiring in conduit. Flexibility and accessibility permit ease of initial installations, facilitate maintenance, repair, relocation and extension of existing wiring systems with minimum expense and delay. Flexibility also permits training cable around structural members, machinery and other obstructions.

Interlocking Armored Cable finds wide application in industrial plants, power stations, substations and various other installations where a flexible yet well protected wiring system is required.

General Cable's modern facilities and knowledge of materials and design considerations insure superior quality and outstanding performance. It pays to specify General Cable Interlocking Armored Cables.

Installation Mahwah Assembly Plant, Ford Division, Ford Motor Company



CONDUCTORS

Copper and Aluminum in full range of sizes.

INSULATIONS

Varnished Cambric, Rubber (Thermax-W, Aquaseal, Gencorone, Butarone), Polyvinyl Chloride, Polyethylene, Asbestos-Varnished Cambric.

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Steel, Bronze, Aluminum.

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Polyvinyl chloride jacket over the armor can be furnished for corrosion protection, where required.

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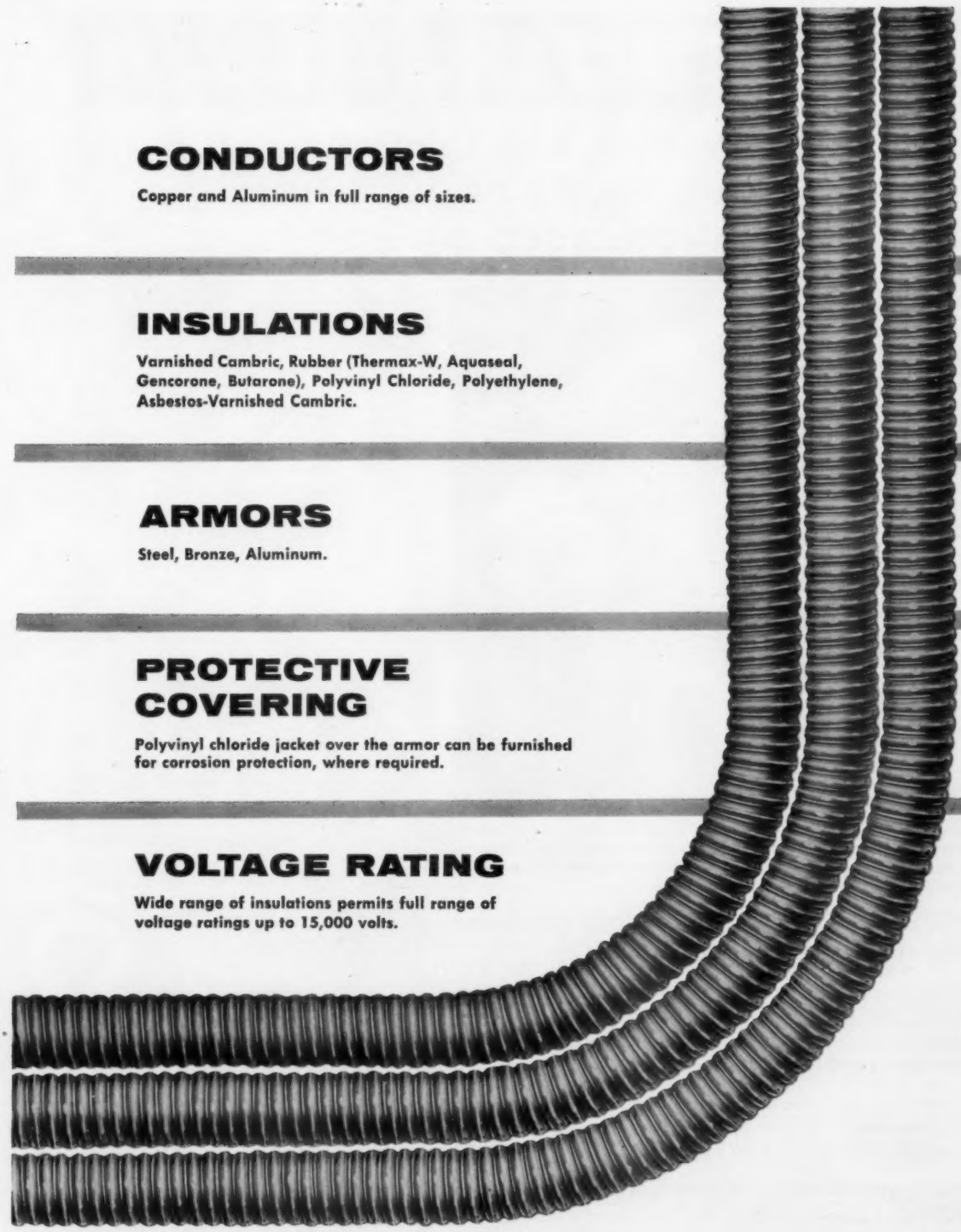
Wide range of insulations permits full range of voltage ratings up to 15,000 volts.



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MICRO SWITCH . . . FIRST IN PRECISION SWITCHING

How MICRO SWITCH Trip Controls give you MORE PRODUCTION with INCREASED SAFETY

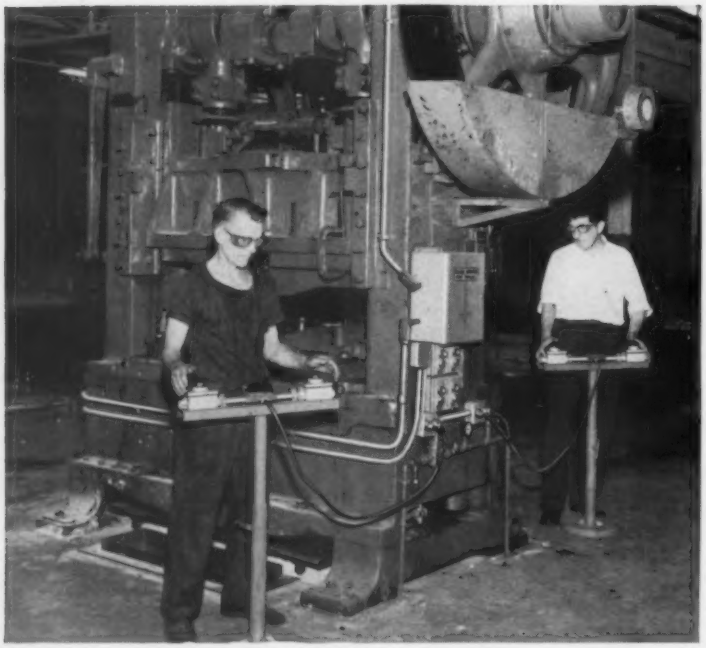

Illustration shows MICRO SWITCH Trip Controls used for multi-operator control of a mechanical clutch machine. Both hands of each operator are required before the press will work.

MICRO SWITCH Trip Controls increase production three ways:

1 They lessen operator fatigue:
Simple, direct operating motions, feather-touch, finger-tip operation of the control switches keep operators fresh and alert throughout the day.

2 They increase operator confidence:
With no worry over personal safety, operators soon develop a smooth, time-saving work sequence.

3 They give instantaneous electrical clutch actuations:
There is no time-consuming "lag" between the time the control is tripped and the machine is actuated. This saves many hours of production time.

MICRO SWITCH Trip Controls have wide range of uses

FOR SMALL PRESSES

Provides faster, safer operation with less effort on small two-hand presses, riveting machines, etc.

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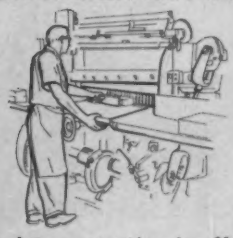

Complete protection is afforded operator in cutting or trimming either flat stock or labels.

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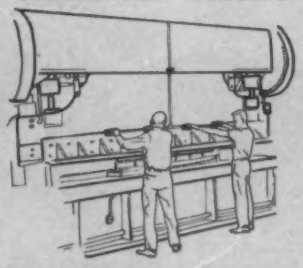

Makes operation of large presses and press brakes safe and less tiring. Any number of operator stations may be "wired into" the control circuit.

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COURT DECISIONS — a summary of legal findings of interest to the plant engineer

Prepared by Albert Woodruff Gray

Expanded Metal Patent

INFRINGEMENT WAS claimed by the owner of a patent for the production of expanded metal. In the defense to the action it was maintained that the patent was invalid. "That a new machine devised for the practice of an old method does not entitle one to a patent for a method of operation, although it may have, as most machines have, a distinctive mode of operation. Ten years before this patent had been granted there had been issued patents for the manufacture of expanded metal and this method, although an improvement, was only such as a skilled mechanic could readily make."

When the action came before the United States Supreme Court on appeal, that court said of the improvements of this character,

"It is often difficult to determine whether a given improvement is a mere mechanical advance or the result of the exercise of the creative faculty amounting to a meritorious invention. The fact that the invention seems simple after it is made does not determine the question. If this were the rule many of the most beneficial patents would be stricken down.

"It may be safely said that if those skilled in the mechanical arts are working in a given field and have failed after repeated efforts to discover a certain new and useful improvement, that he who first makes the discovery has done more than make the obvious improvement which would suggest itself to a mechanic skilled in the art, and is entitled to protection as an inventor." Expanded Metal Co. v. Bradford, 214 U. S. 366.

Freight Containers

AFTER FIVE YEARS of experimental work, containers had been developed by an inventor for freight shipments by rail or water. They were equipped with doors at one end sufficiently large for the entrance of workmen and capable of being stacked by means of legs and receiving sockets. Detailed information, with copies of the patent application and blueprints, was furnished a prospective purchaser by the inventor.

When negotiations for the purchase of the invention ended with the rejection by the prospective purchaser, it was followed by the production of similar containers copied from the information that had been furnished.

In its reversal of a decision holding that no liability attached to the user of this information since the facts were available to him through other sources, the Federal Court said,

"It is unquestionably lawful for a person to gain possession through proper means of a competitors products and through inspection and analysis create a duplicate unless, of course, the item is patented. But the mere fact that such lawful acquisition is available does not mean that he may through a breach of confidence gain the information in usable form and escape the efforts of inspection and analysis.

"However, the fact that a trade secret is of such a nature that it can be discovered by experimental or other fair and lawful means does not deprive its owner of the right to protection from those who would secure possession of it by unfair means." Smith v. Dravo Corp., 203 Fed. 2d 369, Illinois.

Loss of Profits

UNDER THE CONTRACT for the construction of a wire assembling machine, the purchasers agreed to pay a third of the price of $10,000 with the order, a third during construction and the balance upon delivery. It was further agreed that the machine should produce TV transmission wire at a minimum rate of 3000 ft an hour and the machine was to be delivered within five months.

When delivered the machine failed to operate satisfactorily and two months later was returned to the manufacturer for the necessary repairs. Subsequently, the purchasers took the machine and arranged for its repairs elsewhere. They were advised that the maximum capacity was only 400 to 500 ft of wire per hour. On the contract, $10,428.75 had been paid in addition to $3,567.56 for repairs after the seizure.

In a suit brought by the purchasers for damages, the California court awarded them the difference between the actual value of the machine as delivered, and the amount paid the manufacturers, plus the additional amount paid others for repairs and the amount of profits, $5,475.86, lost by them in the production of wire during this period.

In its award of these lost profits as damages, the court said, "It is well established that damages be awarded for loss of profits where such profits can be shown with a reasonable degree of certainty. Loss of profits, either present or future, may be recovered upon a breach of contract if such loss is the direct and natural consequence of the breach and the amount thereof can be shown with sufficient certainty." Mann v. Jackson, 296 Pac. 2d 120, California, April 23, 1956.

Demand for Tools

DRILLING TOOLS were pledged by their owner in payment of a promissory note for $5000. When the note was paid, the owner failed to take back his tools and left them with his former creditor.

For years this string of drilling tools remained unclaimed. In the meantime, the possessor of the tools sold them. In Oklahoma, it is provided that an action for the taking, detaining or injuring of personal property must be brought within two years.

When such action was finally brought by the owner of these tools, the Supreme Court of Oklahoma held that the owner of the tools could not recover:

"Demand within the statutory time was necessary. Though many years lapsed from the date of the payment of the obligation no demand for delivery of the property was ever made and no excuse for the unreasonable delay is shown." Cook v. Bingham, 179 Pac. 2d 470, Oklahoma, April 8, 1947.

Acceptance by Mail

IN RESPONSE TO AN invitation by the United States for bids on a special type of machine bolt, a Rhode Island manufacturer submitted its bid by mail. Before notice of the award of the contract was received, the manufacturer discovered an error in its computation and telephoned that it was withdrawing this bid, which it confirmed that day by telegram. The Government refused to recognize this withdrawal on the ground that the notice of the award had been already mailed, although not received by the manufacturer.

The United States Court of Claims held that the acceptance of this bid by the Government and forwarded to the manufacturer by mail, did not become an acceptance which made a binding contract until its receipt by the manufacturer. Consequently, as

COURT DECISIONS

the bid had been withdrawn before its acceptance, the manufacturer was not liable for its refusal to perform a contract which had not been made.

In reference to the current postal regulations and their effect on the old rule of law that an offer by mail became a contract the moment the acceptance was posted, the court said,

"Under the old Post Office regulations when a letter was deposited in the mail the sender lost all control of it. It was irreparably on its way. Naturally the authorities held that the acceptance in any contract became final when it was deposited in the mail box since the sender had lost control of the letter at that time."

Then of the present Post Office regulations permitting the recovery of a letter by the sender at any time before delivery, the court added,

"When this new regulation became effective the entire picture was changed. The sender now does not lose control of the letter the moment it is deposited in the post office box but retains the right of control up to the time of delivery. The acceptance therefore is not final until the letter reaches destination since the sender has the absolute right of withdrawal from the Post Office and even the right to have the postmaster at the delivery point return the letter at any time before actual delivery." Rhode Island Tool Co. v. U. S., 128 F. S. 417, February 8, 1955.

Contributory Infringement

PUMPS THAT HAD BEEN patented and sold for use in oil production from sand infested wells were repaired by a machine shop in the oil fields of southern Arkansas. Suit brought by the owner of the patents maintained that these repairs were a contributory infringement of the patent.

When in use, this pump was lowered to the bottom of a well and connected with the surface by a pipe through which the pumped fluid passed. At the bottom of the pump the fluid is admitted through a standing valve of a metal ball and seat and forced out through the top into the pipe leading to the surface.

The efficiency of the pump lies in the close fitting of the pipe of the plunger with the standing pipe of the valves. With a leak of any considerable amount the fluid at the bottom of the well merely churns with no pressure adequate for forcing it to the surface.

When sand is present the parts wear thin and without repair the life of a pump of this character is from 24 hours to a year. In its decision that these repairs were not an infringement of the manufacturer's patents, the Federal Court said,

"Under the law the owner of a patented machine is not permitted to make other machines or to reconstruct it but it does permit the replacement of parts often worn out, which the inventor contemplated would have to be frequently replaced anew during the time that the machine as a whole might last.

"The license granted to a purchaser of a patented combination is to preserve its fitness for use so far as it may be affected by wear or breakage. Beyond this there is no license." El Dorado Foundry Machine & Supply Co. v. Fluid Packed Pump Co., 81 Fed. 2d 782, Arkansas.

Fractured Chain Link

IN THE LOADING of scrap iron onto a truck with a tractor crane, a link in the chain holding the boom in place broke, injuring a workman. After the accident an examination of the chain disclosed a crack in this link. At the time of its manufacture there had been a tiny defect that had slowly grown in size. Its presence, though not its extent, would have been disclosed by a careful inspection.

Suit was brought for these injuries against not only the users of the crane but against its owners from whom it had been leased. From the award of damages to the injured man, an appeal was taken by both the owner of the crane and the lessee, under the contention that they were not liable as the defect was not discoverable with a reasonable inspection.

In the affirmance of the judgment, it was held by the court: "The crack in the fractured face of the link that broke had existed for at least two years and its existence was reasonably discoverable by visual inspection, thereby, establishing that use of the crane was imminently dangerous to any person in the vicinity of its boom." La Rocca v. Farrington, 92 N.E. 2d 829, New York, July 11, 1950.

Useful Patents

SUIT WAS brought in a Federal Court in Iowa for the infringement of a patent for metallic cores for concrete culverts, so constructed as to expand and contract, thus being adapted to culverts of different sizes.

In the defense to this infringement action, it was contended that the patent was invalid and, hence, there was no infringement, since a mechanical invention to be patentable, must be useful.

This invention, according to the court, had a defect fatal to the validity of the patent, in that when the core had been once expanded it would not return to its original form. "In other words," said the court, "the invention is 'new' but it is not 'useful.'"

In its decision, the court summarized this feature of the patent law to which the statute refers as "useful." "The term 'useful' as contained in the patent law when applied to a machine means that the machine will accomplish the purpose practically when applied in industry. It is to be given a practical and not a speculative meaning. It means that the machine will work and accomplish the purposes set forth in the specifications.

"To be sure it is well established in the patent law that a machine need not be perfect in order to be patentable. If it will accomplish the purposes set forth in the specifications practically in industry, the patent is valid although the machine may be greatly improved by the addition of some new element. If, however, it will not work practically in industry when constructed according to the claims and specifications, it is not useful and cannot be sustained upon the showing that it can be made to work by a small improvement." Besser v. Merrilat Culvert Core Co., 243 Fed. 611, Iowa.

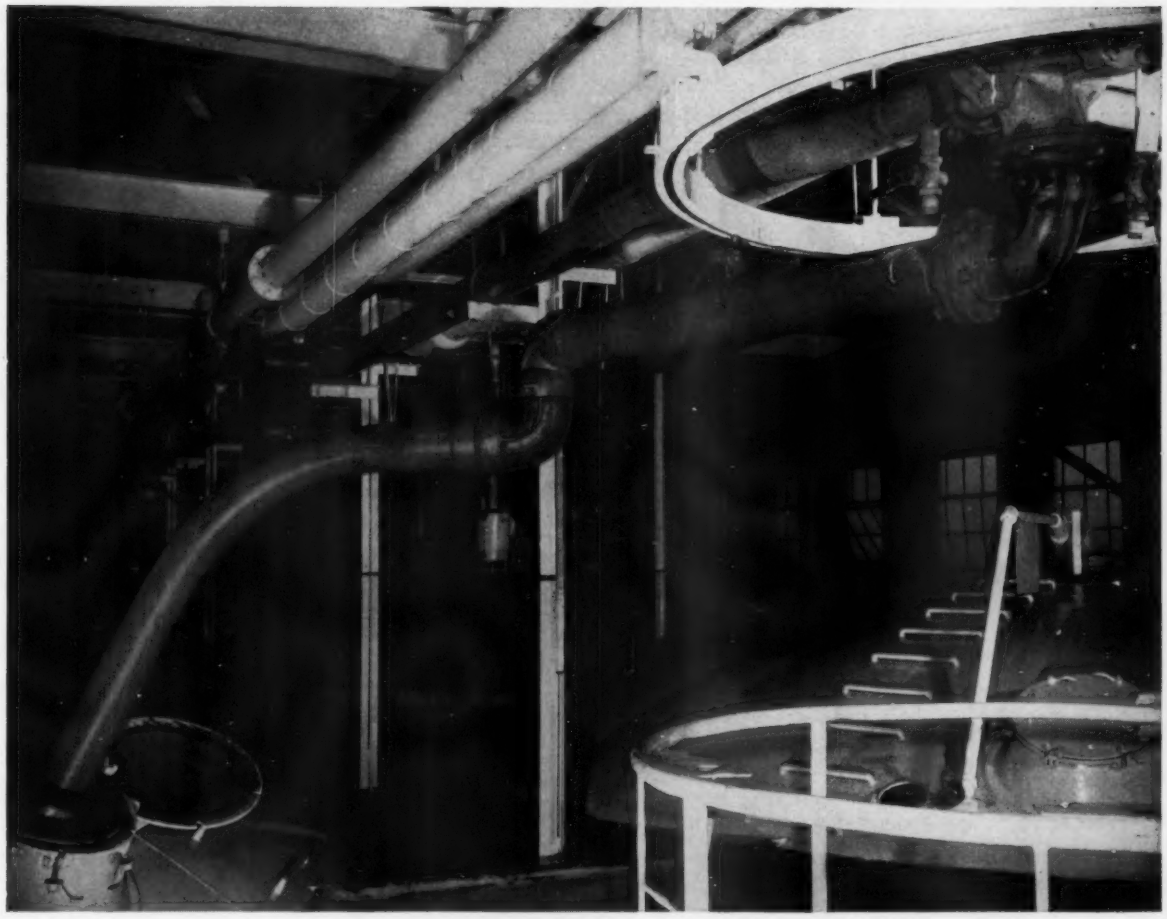
Date of Contract

INVITATION BY THE Soil Conservation Service for bids for the rental of equipment was received by a Missouri plant. The bid of this manufacturer was $1000 a month, conditioned on the acceptance by the government within ten days from the opening of the bids.

Inquiry was made a month later by the Department of Agriculture, "Is your bid still open for acceptance," to which the manufacturer replied in the affirmative. Ten days later the original bid was returned with the acceptance of the Government, dated February 10th, and received by the manufacturer two days later. This machine, according to the Government, was not installed and put into operation by the manufacturer until March 12th.

Suit against the Government was brought by the manufacturer for rental of equipment from February 10th to March 12th, which the Government refused to pay. The equipment, the court held, had been located on the job for three months from March 12th and the rental for those three months and no more was owed by the Government. United States v. Mitchell, 104 Fed. 2d 343, Missouri.

HIRAM WALKER REPORTS ON CHIKSAN SWIVEL JOINTS



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That's the performance record of the Chiksan swivel joints at the Peoria, Illinois plant of the Hiram Walker Company. Day in and day out for eleven years, Chiksan swivel joints have given the necessary flexibility of flow lines, and safety of operation in the transfer of mash to the fermenters without line rupture or loss of product. The packing on these swivel joints *has never been changed* even though low pressure steam is continually run through the assemblies when they are not in operation. Assure yourself of minimum maintenance with long trouble free operation by specifying versatile Chiksan swivel joints.

Chiksan swivel joints turn with full 360° rotation in 1, 2 and 3 planes, handling, air, hydraulics, fuels, oils, water and other fluids.

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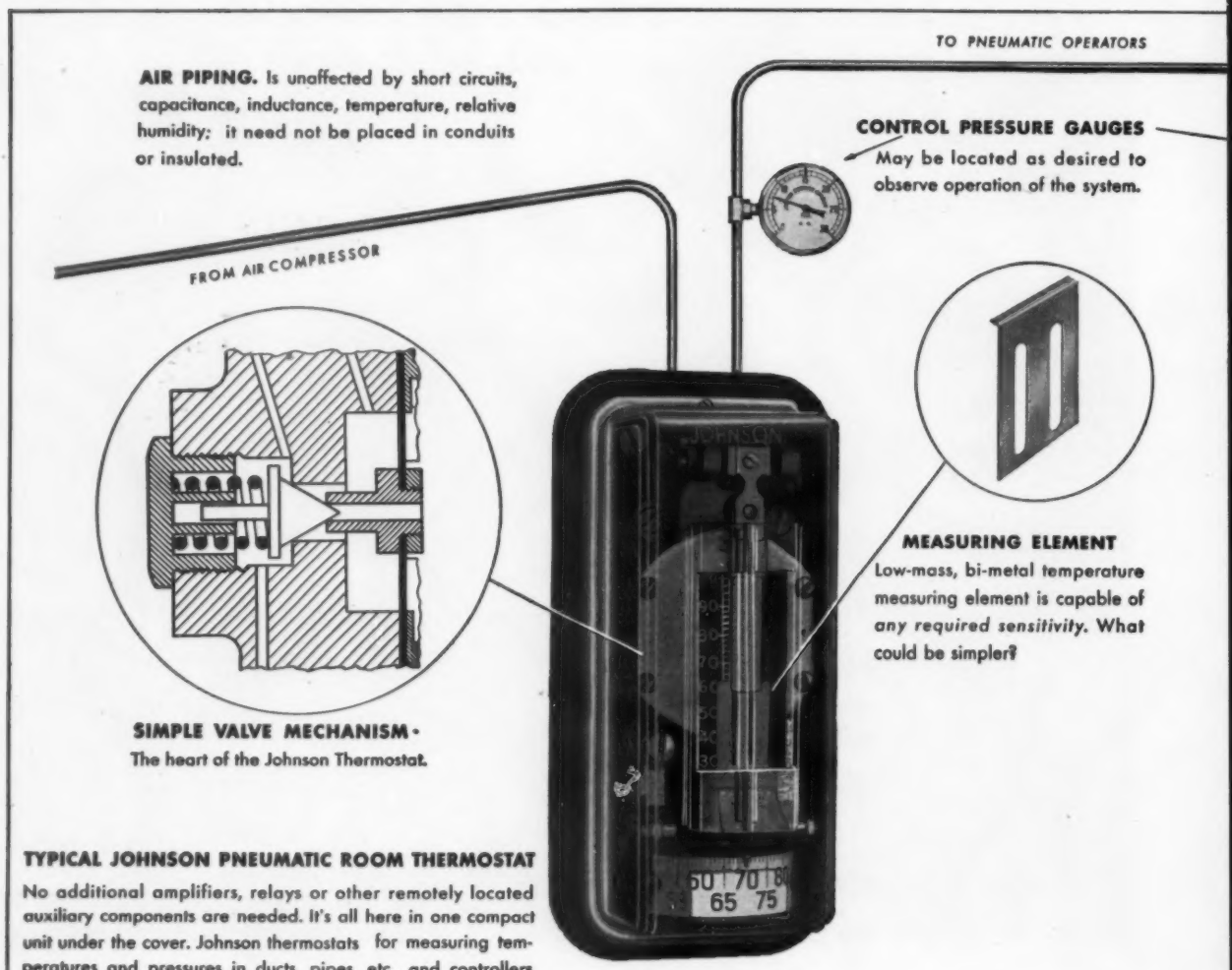
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MEASURING ELEMENT
Low-mass, bi-metal temperature measuring element is capable of any required sensitivity. What could be simpler?
SIMPLE VALVE MECHANISM·
The heart of the Johnson Thermostat.
TYPICAL JOHNSON PNEUMATIC ROOM THERMOSTAT
No additional amplifiers, relays or other remotely located auxiliary components are needed. It's all here in one compact unit under the cover. Johnson thermostats for measuring temperatures and pressures in ducts, pipes, etc., and controllers for relative humidity are equally simple.

INSURE SYSTEM-WIDE SIMPLICITY

For All Types of Industrial and Commercial Applications—Air Conditioning • Heating • Cooling • Ventilating • Humidifying • Dehumidifying • Processing

The basic components of Johnson Pneumatic Control, shown above, reveal how remarkably simple and free from complication the best control systems can be.

The Johnson Room Thermostat—the world's most accepted thermostat—is a refined reducing valve in a compressed air line, set and reset automatically by an accurate bi-metal temperature measuring element, to transmit compressed air, at varying pressures, to valves, dampers and other devices.

Johnson Diaphragm Valves and Damper Operators are equally simple devices with flexible, long-life diaphragms which are moved as the thermostat transmits changes in air pressure. Only pneumatic control gives you system-wide simplicity.

The widespread use of pneumatic power by other industries offers further evidence of its simplicity and adaptability. Examples include truck and train brake systems, industrial power tools, hoists, bus suspension systems, lubricating equipment, machine tools and countless others.

Compare *systems* carefully. You'll discover that Johnson pneumatic apparatus is simpler by far and that you can do control work with just a fraction of the components that would otherwise be required.

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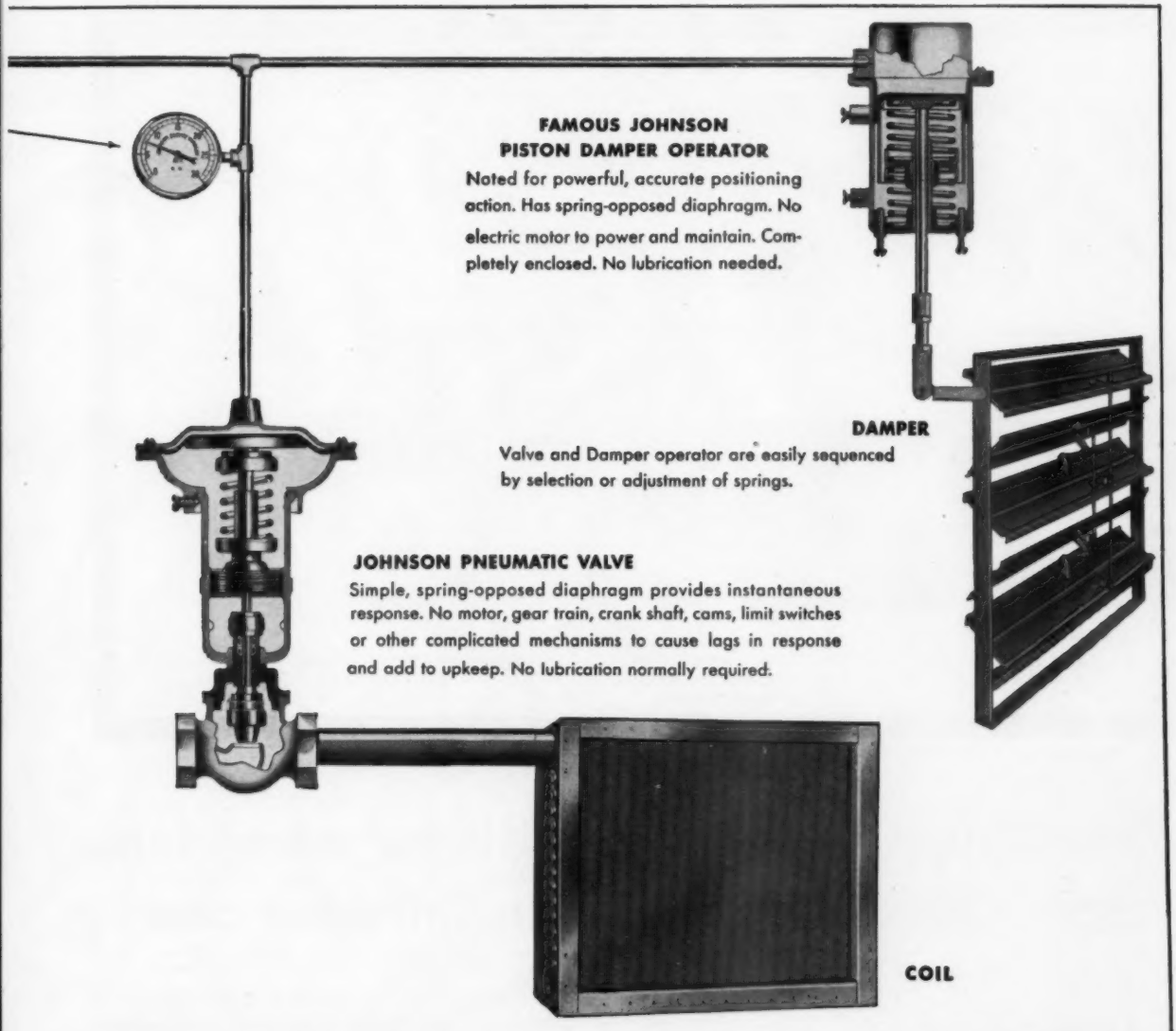

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Noted for powerful, accurate positioning action. Has spring-opposed diaphragm. No electric motor to power and maintain. Completely enclosed. No lubrication needed.

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Valve and Damper operator are easily sequenced by selection or adjustment of springs.

JOHNSON PNEUMATIC VALVE

Simple, spring-opposed diaphragm provides instantaneous response. No motor, gear train, crank shaft, cams, limit switches or other complicated mechanisms to cause lags in response and add to upkeep. No lubrication normally required.

COIL

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YOU'LL BE BETTER SATISFIED with PNEUMATIC BECAUSE TODAY'S PNEUMATIC CONTROL

- *Has fewer components per system.*
- *Is highly accurate, dependable—has fewer components subject to failure.*
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- *Offers the widest choice of compensating, sequencing and other operating features.*
- *Provides the necessary flexibility to solve even the most intricate control problems.*
- *Is completely safe under all conditions.*

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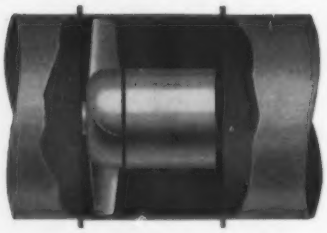
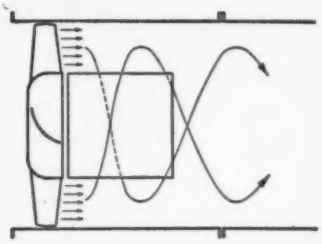
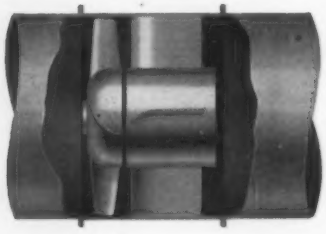


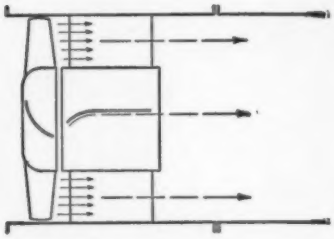
The tubeaxial fan . . . a wide range of volumes at medium pressures, with uniform velocity . . .



. . . at moderate pressures the spiral air discharge straightens out a short distance from fan blades.



The vaneaxial fan . . . stationary guide vanes reduce turbulence and increase fan efficiency . . .



. . . resulting straight-line air flow leaving fan assures smooth, quiet operation for all conditions.

Easy-to-install American Blower axial fans save space, lower your installation cost

Versatile American Blower axial fans can be mounted vertically or horizontally. When ducts are properly reinforced, the fan can be supported directly by the duct connection.

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For more information on axial fans, or on other equipment from American Blower's complete air-handling and -conditioning line, call our nearest branch office, or write direct to American Blower Division of American-Standard, Detroit 32, Michigan. In Canada: Canadian Sirocco products, Windsor, Ontario.

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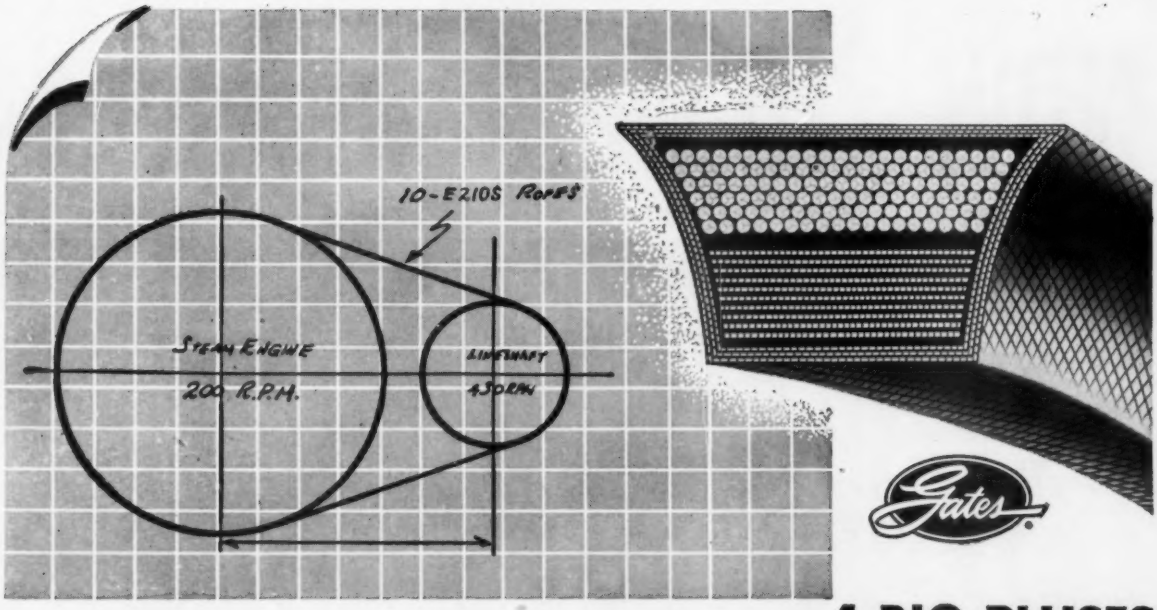

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A Gates Super Vulco Rope drive will deliver more horsepower per dollar invested than any standard V-belt drive.

Actually, the greater load carrying capacity of Super Vulco Ropes cuts down the number of belts required (5 Super Ropes do the work of 7 standard belts) . . . thus reducing the width of sheaves.

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Super-strength cords provide 40% greater horsepower capacity . . . easily absorb heavy shock loads.

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Concave Sidewalls (Fig. 1) increase belt life. As belt bends, concave sidewalls (U.S. Pat. No. 1813698) become straight, make uniform contact with sheave groove (Fig. 1-A). Uniform contact means less wear on sides of belt . . . longer V-belt life.

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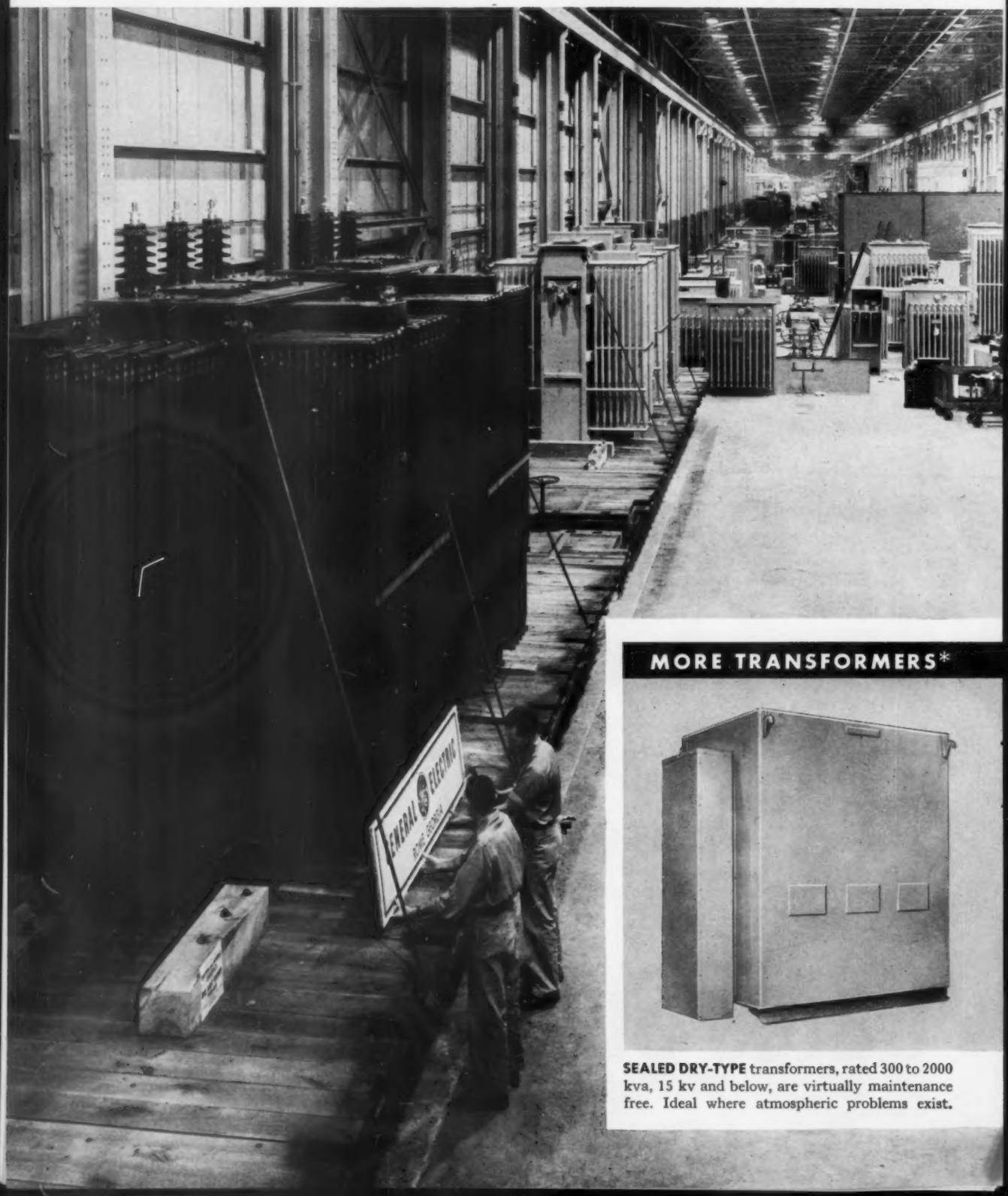

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Standard-design transformers plus the General Electric repetitive manufacture process make possible this fast shipment. Standardization eliminates engineering and design time required for special units. Repetitive manufacture brings highly efficient production-line techniques to transformer production.

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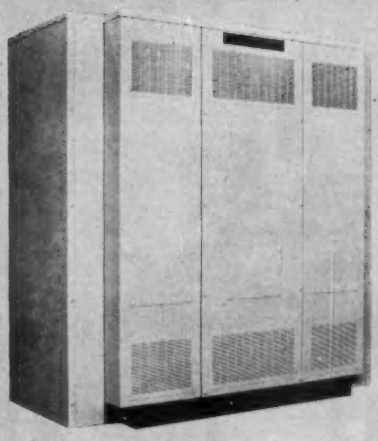

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Manually, Mechanically, or Electrically Operated

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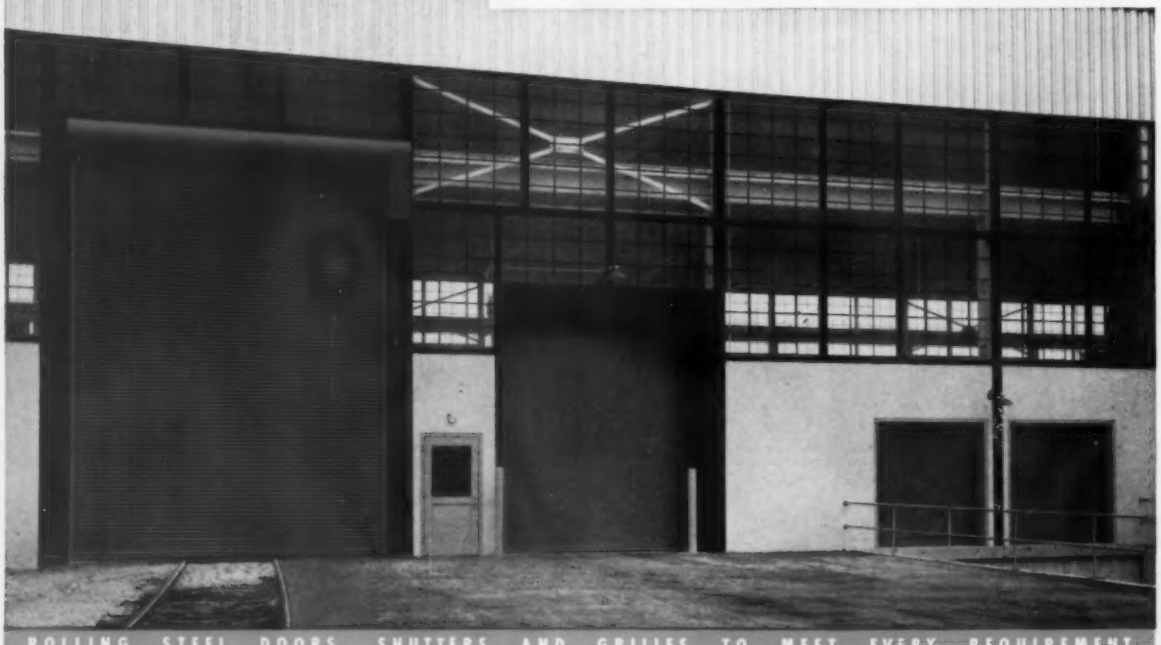

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Mahon Power Operated Rolling Steel Doors installed in a railroad opening, a truck opening, and two loading dock openings in a new building for Samuel G. Keywell Co., Inc., Detroit, Michigan. Campbell Engineering Co., Designers. H. F. Campbell Construction Co., General Contractors.

MAHON

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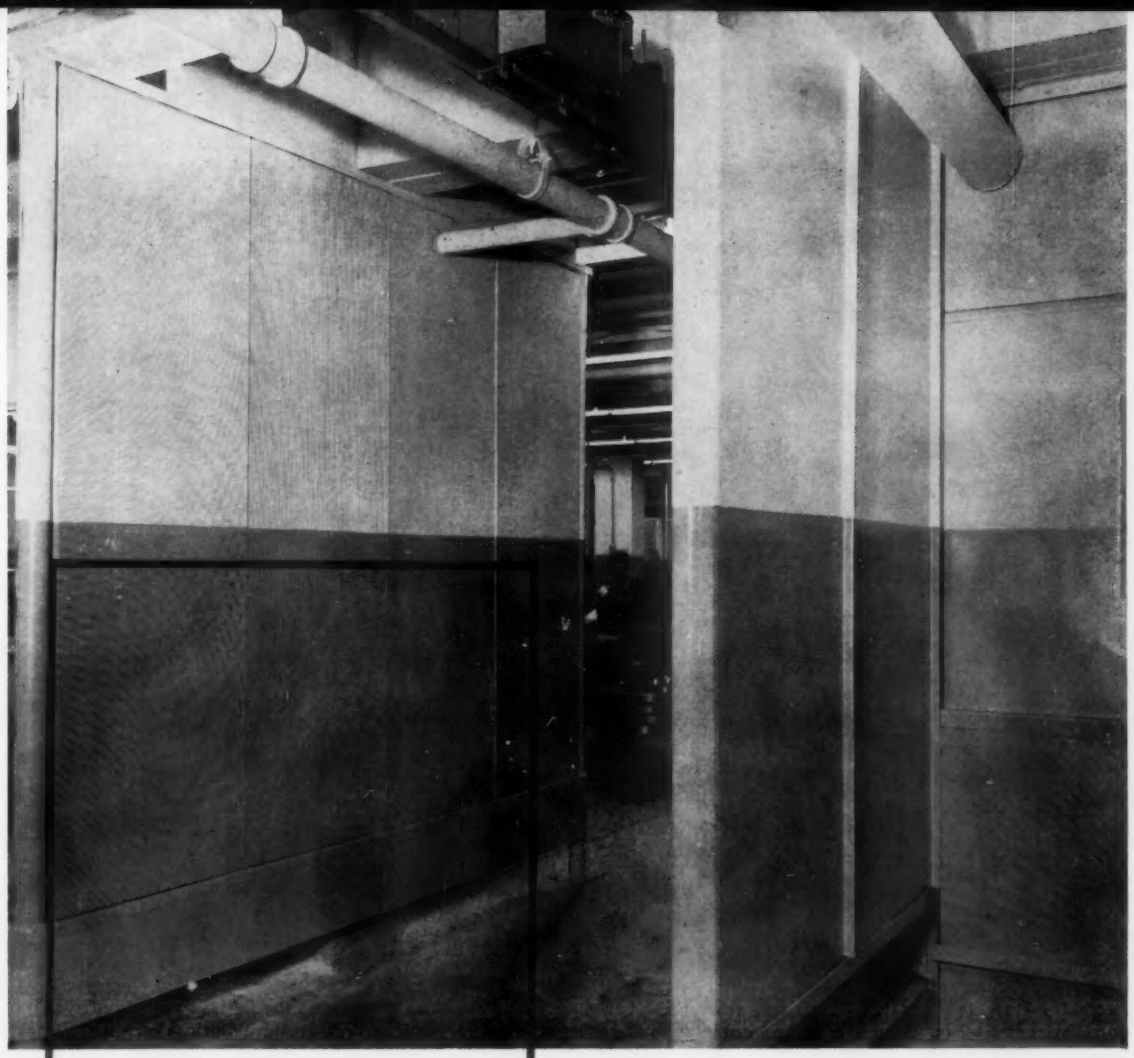


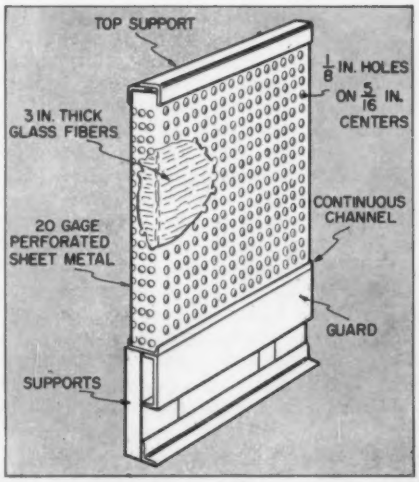


Fig. 1. Top of page: Sheet metal and glass fiber partition baffle serves as an acoustical corridor at new plant. Fig. 2. Sketch above shows details of noise-killing partitioning

Noise Reduction—

Where It's Really Tough

By D. R. BROWN and C. L. COYNE, Engineers
Western Electric Company, Chicago, Illinois

Noise Reduction — Where It's Really Tough

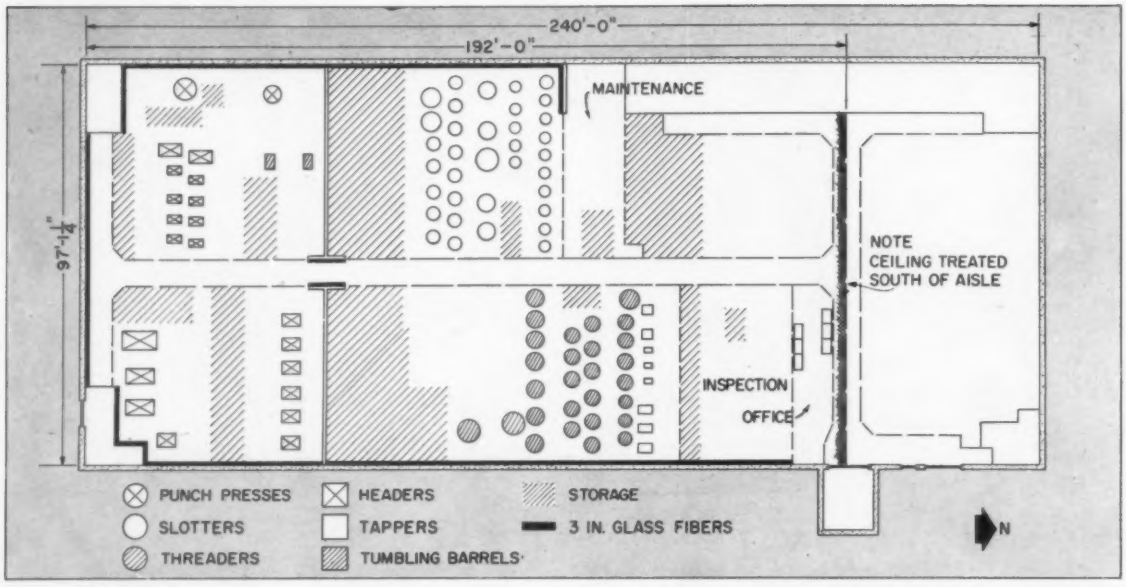


Fig. 3. Machines at the new location were laid out and segregated in the plant according to their various noise ratings

One of industry's noisiest locations is that of a commercial screw department often considered to be incurable. However, 78 per cent noise reduction attained at one work position

WESTERN ELECTRIC Company, as the manufacturing branch of the Bell System, is called upon to produce thousands of items necessary to the operation of the world's largest telephone system. The majority of these items are unique to the field of telephony but some are basic products common to all industry. One such item, the commercial screw, is produced by the millions each year for use in the assembly of Bell System equipment.

Commercial screw manufacturing operations are notoriously noisy but in the past this noise has been accepted as unavoidable. At Western Electric, considerable attention has been given to the reduction of excessive industrial noise throughout its plants.

Recently the commercial screw department (approximately 100 machines) was moved from the company's Chicago plant to a new location at Montgomery, Illinois. This move afforded the company's engineers an excellent opportunity to reduce the noise in the new location. In an effort to achieve maximum noise reduction, basic parameters influencing noise generation and propagation were evaluated at both locations.

First steps taken were to determine and compare the acoustical properties of the old and new locations. The original location was a long narrow building having a plaster ceiling, brick walls and a wooden floor partially covered with sheet steel in the machine areas. The new location is essentially a rectangular concrete structure.

Both buildings had relatively poor acoustical properties but the new location was the least desirable since concrete absorbs less incident sound energy than plaster, brick or wood. Calculations showed that if the equipment were installed in the new location without acoustical treatment of the room the ambient noise level would increase considerably.

Next step was to determine the acoustical power of each machine and develop a floor plan which would locate individual machines in relation to this power, rate of attenuation and proximity to personnel. Sound level readings were made of each machine at the old location using a sound level meter, octave band analyzer and graphic recorder.

Corresponding power level values were computed for each machine. Knowing the power level of each source and how rapidly this power would be dissipated at the new location after the proposed treatment, it was possible to estimate the sound pressure level at any given point for various machine arrangements.

During the course of this study, it was determined that the acoustical power emitted by the larger machines such as headers and punch presses could not be dissipated rapidly enough to give the desired reduction in sound pressure levels at the location of most of the people in the shop. This led to a floor plan which isolated these machines from the main shop area by the installation of a sheet metal and fibrous glass partition with a specially designed "acoustical corridor" which permitted free travel between areas without troublesome doors. One of these corridors is shown in Fig. 1. In effect, this corridor is a lined duct connecting the two areas. It is effective in blocking sound but does not interfere with ventilation or traffic.

It was further agreed to provide vibration mounts for all machines which did not produce large transverse forces. This included everything except the heading machines which were securely anchored to the concrete floor. Machine mounts of this type minimize the amount of vibration transmitted from the machine to the building where it is radiated as noise.

Approximately 19,000 sq ft of 1-in. thick perforated cane tiles were cemented to the ceiling. The walls surrounding the area were covered with special panels consisting of 3-in. thick glass fiber boards protected by No. 20 gage sheet metal perforated with ⅛-in.

Fig. 4. Typical machine layout in old location

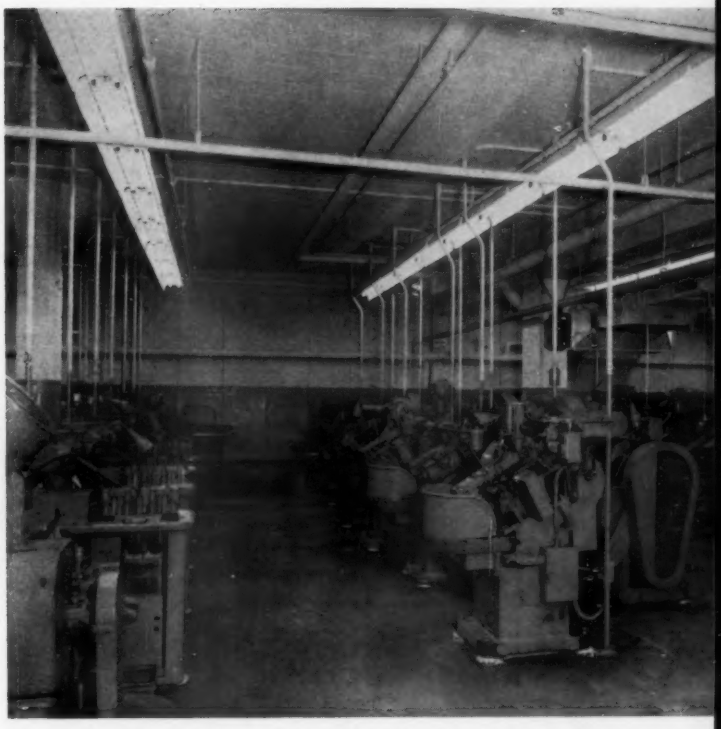


Fig. 5. Acoustically treated walls and ceilings and vibration mounts under machine are visible evidence of authors' noise reduction effort

holes on 5/16-in. centers. Details of these panels are shown in Fig. 2. The panels were assembled in a modular system to permit standardization and ease of installation and maintenance. This design also enhanced the appearance of the building, a factor often overlooked in application of this type of treatment.

Figure 3 shows a schematic floor layout for the new location. At the old location a concentration of individual machines and groups of machines caused the noise to build up in one corner of the building. Studies showed machine groups varied considerably in amount of noise created with a rating in the following order from noisy to quiet: 1. Medium headers; 2. large headers; 3. small headers; 4. slotters; 5. threaders; 6. punch presses; 7. tumbling machines; and 8. tappers.

Layout for the new location shows how machine group locations were based with respect to their noise "rating." The medium headers, for example, were moved as far as possible from all other machine groups and placed in a "treated corner" where the sound could travel only in two directions without being absorbed. Calculations showed that by the time the noise from the medium headers reached any other group the level was so low it had no significant effect in raising the noise level of that group.

Tappers, being in the quietest machine group, were placed nearest the inspection and office areas of the shop to minimize the noise in those locations. Machine groups were isolated from each other by storage areas in an effort to "break up" sound as much as possible and give it a chance to diminish in its travel from one group to another.

Figures 4 and 5 show typical machine areas for the old and new locations. The vibration mounts are also visible under each machine in Fig. 5. Figure 6 shows portions of the wall

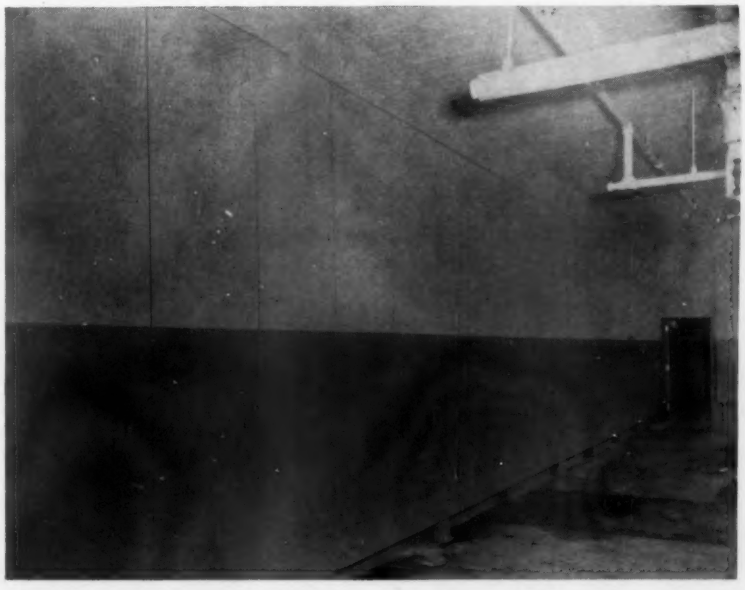


Fig. 6. Long stretch of partition in new location using glass fiber and metal

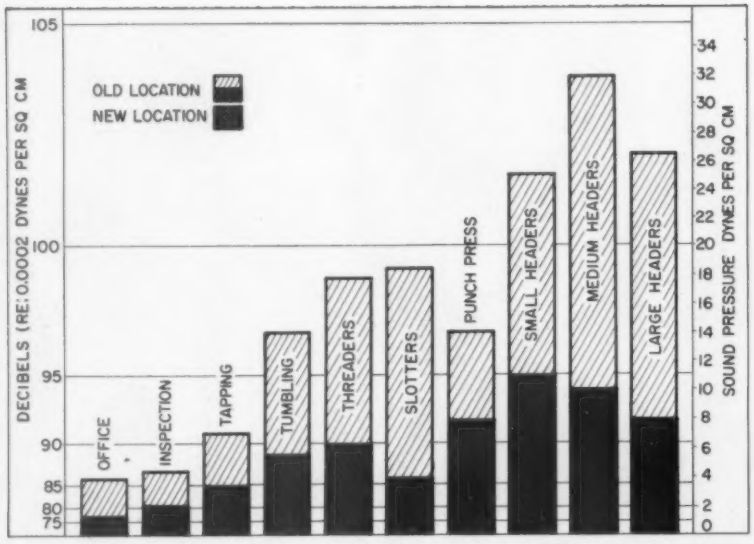


Fig. 7. Average operator exposure to various machine groups in both locations

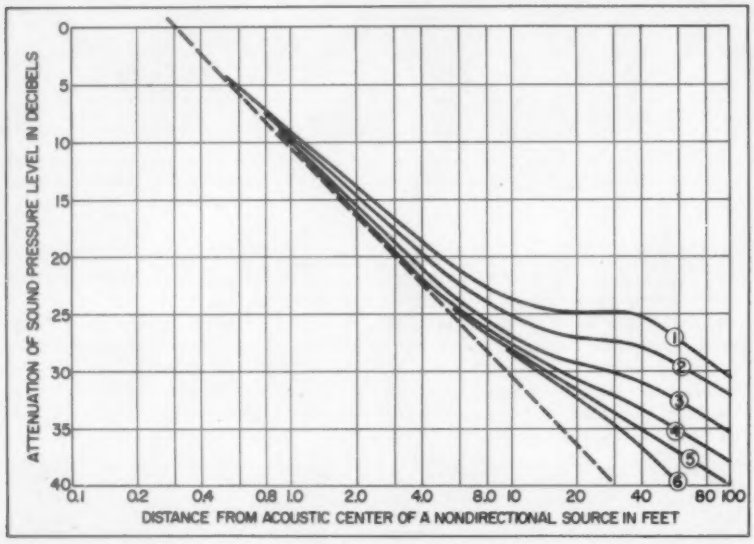


Fig. 8. Curves obtained by measuring level at various distances from sound source

and ceiling treatment in the new building.

After the building was completely treated and all the machines were installed and operating, readings were taken to determine "average operator exposure levels" for the various machine groups. Sound pressure level at different points in any given machine group was fairly constant as it had been for the old location. Because of this consistency, it was decided to use "operator exposure level" figures as a means of evaluating the noise reduction.

Figure 7 shows "average operator exposure levels" for machine groups in the old and new locations. Looking at the chart we see that the operators of the medium heading machines were exposed to an average sound pressure level of approximately 104 db (32 dynes per sq cm). By directly comparing the sound pressures we can compute the per cent noise reduction achieved. The noise exposure of the medium header operators was reduced by approximately 70 per cent. The noise reduction achieved is given by the work locations of the machine operators, inspectors, office workers.

Application of sound absorbent material to the ceiling and walls was the major factor in reducing operator exposure. The effect of this treatment can perhaps best be explained by referring to Fig. 9, which shows a hypothetical three-story building. Each floor represents a different acoustical condition equivalent to open air; the old manufacturing area; the new area with no sound treatment; and the new location with the final treated area.

Relative spread of hazardous noise under each condition can be seen. For purposes of comparison, we have shown an adjustable noise source in open air on the roof of the building and have increased the intensity of the

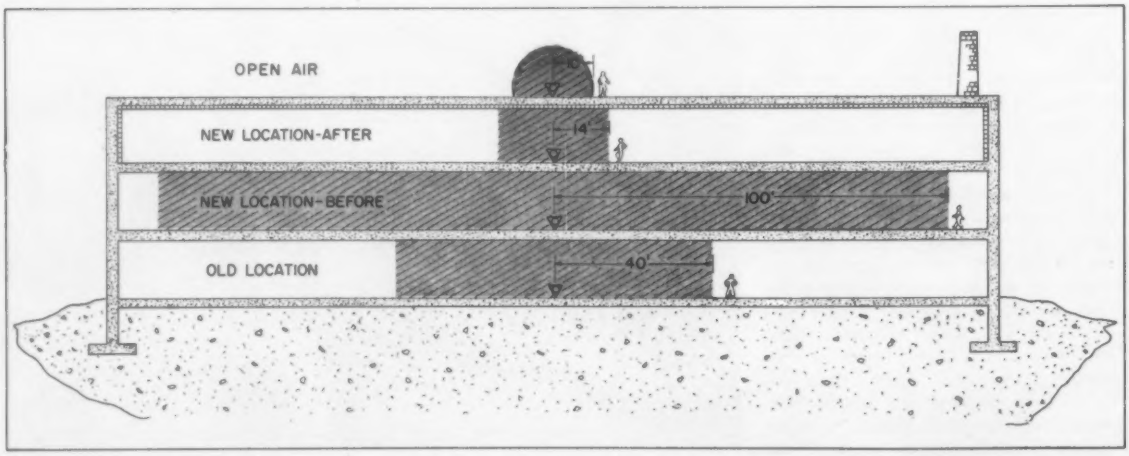


Fig. 9. Relative spread of a constant intensity noise in three locations in hypothetical building and also in open air

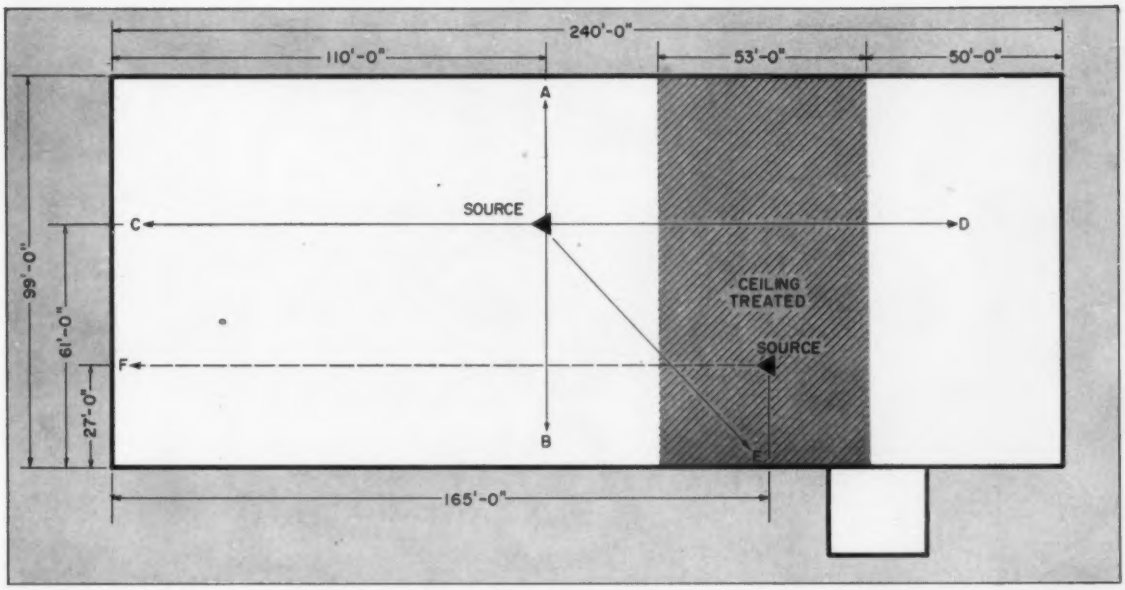


Fig. 10. Partially treated room with relative positions of noise source, treatment and listener locations. See Fig. 11

source until it radiates a hazardous noise level for a radius of 10 ft. As we move the source from one floor to another, holding the intensity constant, the hazardous noise spreads according to the amount of reflection offered by the room surfaces.

An operator is shown on each floor located as close as possible to the noise source without being exposed to the hazardous noise. It is obvious from Fig. 9 that the sound absorbing material on the "third floor" is very effective in reducing the spread of noise and approaches the optimum conditions of open air. The relative spread of sound will be the same for all three floors regardless of the intensity of the source.

Not All Sounds Pure

Throughout this article emphasis has been given to the fact that all calculations pertaining to the behavior of noise in enclosures were based on the assumption that all sounds were pure tones. This, of course, is not the case because it is complex noise that is found in screw machine and other plant areas. As anticipated, this assumption led to discrepancies between computed and actual reductions.

Figure 8 shows a series of attenuation curves obtained by measuring the sound pressure level at various distances from the spherical radiator. Curve 1 was plotted after 1200 sq ft of ceiling were treated; Curve 5 after the entire ceiling was treated; and Curve 6 after the acoustical treatment was complete. Curves 2 through 4 show the effect of increasing amounts of acoustical tile on the ceiling. Impact noises attenuate at approximately the same rate as pure tones up to a distance of 30 ft, but beyond this distance the attenuation is significantly greater. It appears that any theoretical analysis of impact noise attenuation based on "pure tone" assumptions is invalid beyond 30 ft.

In relatively large buildings small concentrations of noisy machines often create hazardous noise levels for workers performing quiet operations in surrounding areas. Because the cost of complete acoustical treatment would be prohibitive it was decided that during the course of installation an attempt would be made to evaluate the effect of partial ceiling treatments.

Figures 10 and 11 show the difference in attenuation of a partially treated room as a function of source, treatment, and listener locations. Figure 10 depicts the relative position of each and Fig. 11 gives the decay curves for the directions indicated. From these curves it can be seen that acoustical treatment of a relatively small percentage of the total surface area will reduce the ambient level by varying degrees depending on location. However, the greatest reduction in noise is realized with the source located directly beneath the treated area (Curve F). Thus by treating the ceiling immediately above noisy machines, hazardous exposure of nearby workers can be reduced.

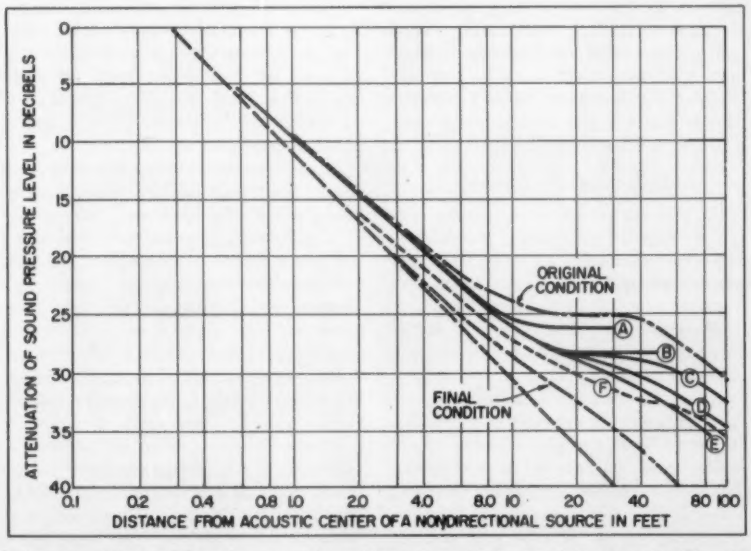


Fig. 11. Effect of location on attenuation of sound in treated room in Fig. 10

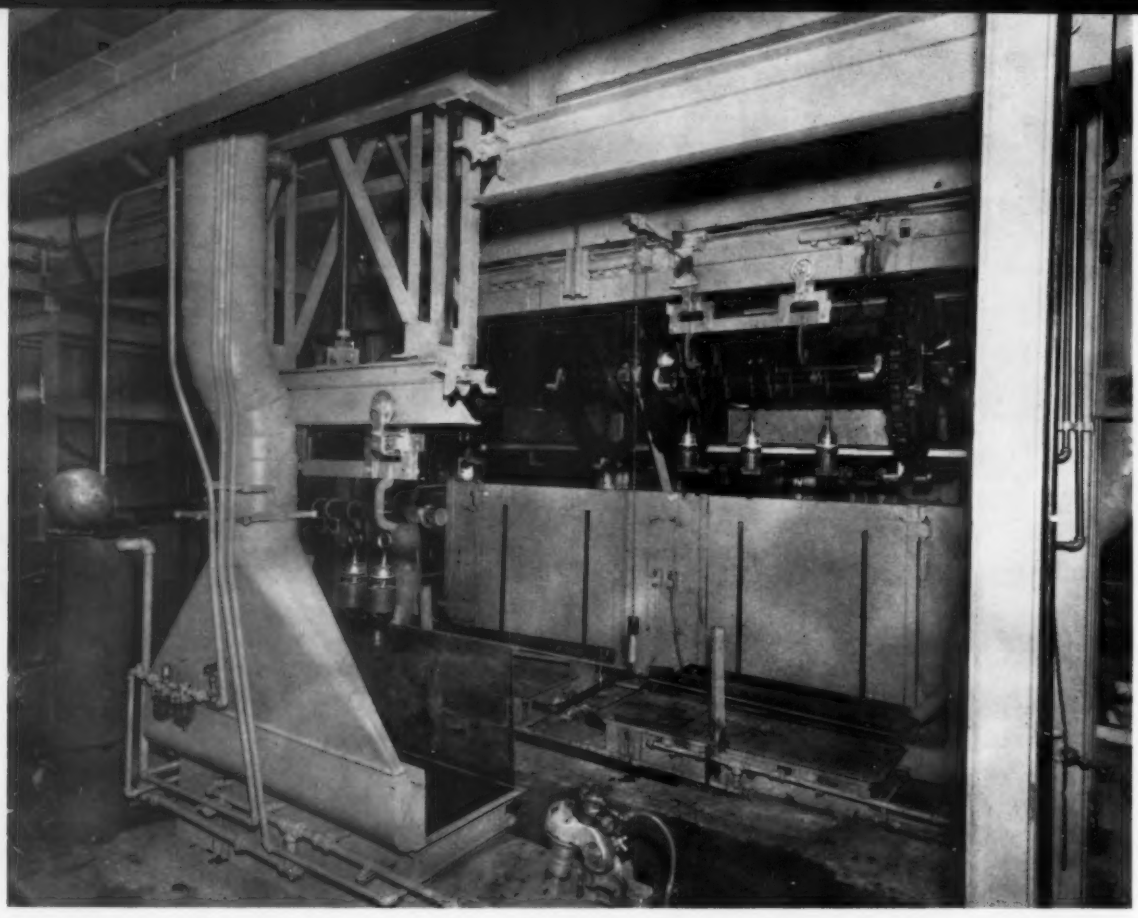


Fig. 1. After preheating, armatures are removed, dipped, and returned for 4-hr heating; another dipping, 4-hr bake follow

Design for Continuous Output—Drying,

RAPID ADVANCES that are being made in production requirements are greatly increasing the interest in and demand for high production processing equipment. Many industrial operations are of such a nature that they can be done continuously. And continuous operation means faster, more efficient and more economical production.

Emphasis on Baking

In the manufacture of motors, one of the important finishing problems is the impregnation and baking of armatures and field and frame coils with varnish, insulant or impregnant.

Normally the installation of equipment to perform this function is not a difficult problem. It requires only a specific and detailed knowledge of production, processing requirements, building conditions and plant layout.

However, one of the largest manufacturers of motors and electrical parts was faced with the particular problem of setting up an entirely new production line for armatures and field coils, taking into consideration a greatly expanded production schedule to meet an estimated 1960 requirement.

The problem confronting this manufacturer was the installation of finishing and baking equipment that would, first of all, handle the parts at high production, and secondly, would use absolutely the minimum of floor space for the process.

After the review of production and the space available, the problem was answered in the following manner.

Step-by-step procedure in this operation consisted of inspection of the parts, electrical testing, preheating, dipping and baking for 4 hr. Armatures are then given a second hot dip, and baked for another 4 hr. All of these processes had to be tied together as a synchronized continuous operation.

Production was to be in the neighborhood of 432 armatures per 64-hr week. Size of armatures ranged from 4½-in. dia. to 16-in. dia., and weighed from 37 lb. to 300 lb. The impregnation times and temperatures were set by the impregnation manufacturer, who also accurately determined baking time and temperatures.

Overall design of the new system was to take into consideration manual loading after electrical test and thence completely automatic operation until the units were completely processed.

Cycle Timing

Each oven consisted of a two-compartment system, with the following cycles and characteristics:

1. One hour preheat cycle; operating temperature 302 F.
2. First dip in impregnant at internal armature temperature of approximately 250 F.
3. First bake for 4 hr; operating temperature 302 F.
4. Second dip in varnish at internal temperature of approximately 250 F.
5. Second bake for 4 hr; operating temperature 302 F.
6. Unload at floor level.
7. Electrical test for voltage breakdown, grounding, resistance.

With these requirements it was de-

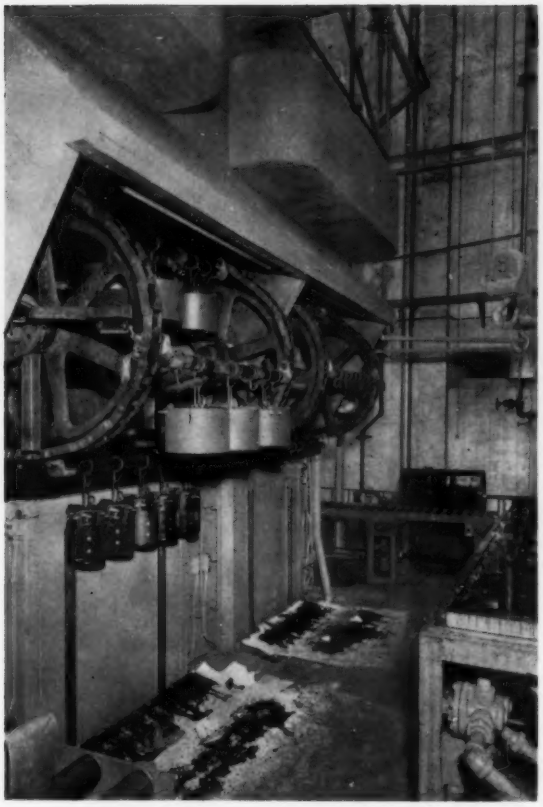


Fig. 2. Field coil frames entering oven for baking

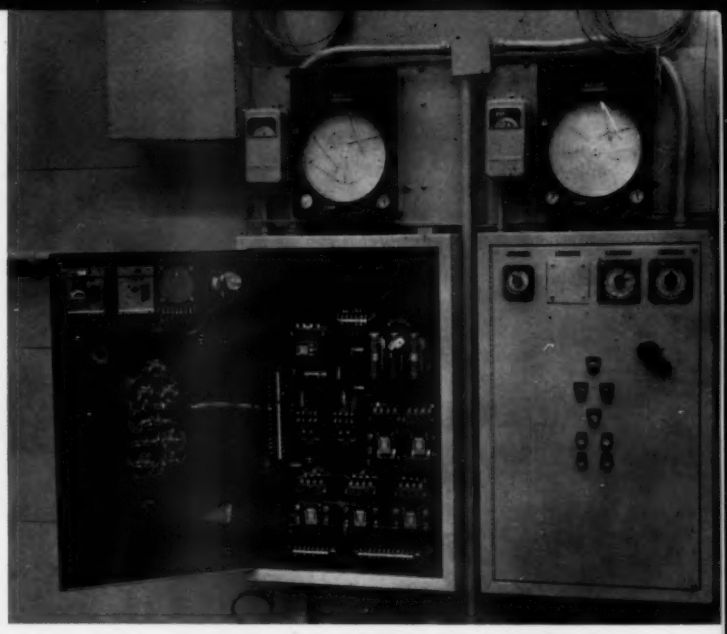


Fig. 3. Above: Automatic conveyor cycling, automatic regulation of temperature and complete control of safety are assured by instruments. Instruments in these panels control the compartmented oven

By A. E. TRIVISON, The W. W. Sly Manufacturing Co.

Dipping, Baking, Are Controlled Safely

termined that one single continuous conveyor, cross-bar type, could be arranged to operate in a vertical path with the loading and unloading accomplished at the same station.

Each oven was divided into two compartments by a common insulated wall. Each of these compartments was to be a complete functioning unit with its own steam heating and exhaust system, all which were mounted along one side of the equipment. Each compartment was complete with the full complement of required safety and temperature controls in keeping with rigid safety standards.

Basic consideration in design of the oven for this job can be described as: efficient air distribution over the work; temperature uniformity in the baking zone; correct exhaust conditions to maintain proper oven atmosphere, and a low overall temperature gradient between the supply and recirculation temperatures.

Each double compartment oven was constructed of a 3 in. thick rock wool insulated sheet metal panel shell measuring 21 ft - 9 in. high by 13 ft - 8 in. wide by 10 ft - 3 in. deep, with a semi "A" type projection located at the front of the oven directly above the load and unload stations. This projection prevented the loss of heat at the work opening.

Door Operation

Directly below the load-and-unload station, a 4-ft by 4-ft motor-operated vertical door, equipped with a rack and pinion arrangement, raises and lowers with the stop-and-start sequence of the conveyor. The entire oven is floor set and supported by heavy structural "H" column supports and crossbeams.

Along the entire travel of the conveyor in the oven there was installed a large volume supply duct located at the center of the oven. This duct had adjustable dampered outlets so arranged that the heated air is directed on the work in both the up-and-down travel. At the entrance end of the oven, where the concentration of volatiles is the greatest, the exhaust pickup duct is located. This duct is connected to the inlet side of the exhaust fan. Primary function of the fan is to exhaust a portion of the oven atmosphere to maintain safe operating conditions within the oven zone.

Recirculation ducts extending approximately three-quarters of the oven height are mounted on the end walls of the oven, directly opposite the supply duct. A major portion of the supply air is taken into these ducts after the heated air passes over the work and is returned to the heater by the action of the suction inlet of the heater fan. This air is returned to the heater at a slightly lower temperature to be reheated to the desired oven temperature.

Heated air for each compartment is furnished by a horizontal type steam heater unit, having a capacity of 400,000 btu per hour, consisting of two high pressure copper blast coils, arranged for five rows of tubes, and connected to a 6000-cfm high temperature supply fan.

The heater was sized not only on

the basis of heat required to bring the work to baking temperature, but more correctly, on the air and solvent load.

Safety controls protect the system against any kind of fuel, power or mechanical failure. The fuel input is regulated according to the demand of the main temperature recording controller.

Individual variable speed conveyors were supplied for each compartment, and consist of two strands of 4-in. pitch heavy roller chain. To these chains are attached saddle arrangements on 32-in. centers. The purpose of these saddles is to carry the heavy pipe crossbars onto which the armatures are hung. This arrangement also allows the operator to lift the fully loaded crossbar, by means of a mechanical hoist, to the automatic dip, loading or unloading stations.

The crossbars are loaded according to the size of the armatures to be processed. On the small size work, as high as nine armatures are hung on one conveyor crossbar.

A total of 16 crossbars constitute the conveyor path of the system. The specific problem insofar as the controls are concerned, are identical for each compartment.

Control Cycle Analysis

Therefore, if we start analyzing the control cycle with the starting point at 8:30 in the evening, a master timer co-ordinated with the time of the day will hold power off from 8:30 p.m. to 6.05 a.m. At this time a contact in the master timer closes, allowing power to the controls and at the same time start up the exhaust and supply fan, as well as a 10-min. purge timer, to purge the oven of vapor concentrations by the flow of recirculated air through the system.

At the end of the 10-min purge operation, the purge timer energizes the steam valve and sets up a circuit to an "on-off" repeat cycle timer, which allows the conveyor starter to be energized every 15 min.

From 6:15 to 7:15 a.m. the armatures go through the preheat cycle, and at 7:30 a.m. the first of the preheated armatures reach the dipping station for their initial impregnation.

Safety Provisions

As soon as the conveyor is energized, a motor circuit is energized to open the vertical lift oven door, allowing the conveyor to travel a distance of 32 in. in approximately 20 sec. The conveyor is stopped by a limit switch energized by the crossbar outside of the oven. After the prescribed 32-in. movement of the conveyor, it is stopped and the circuit energized to close the oven door. The opening and closing of the door is a motorized operation equipped with limit switches to assure full open and closed travels.

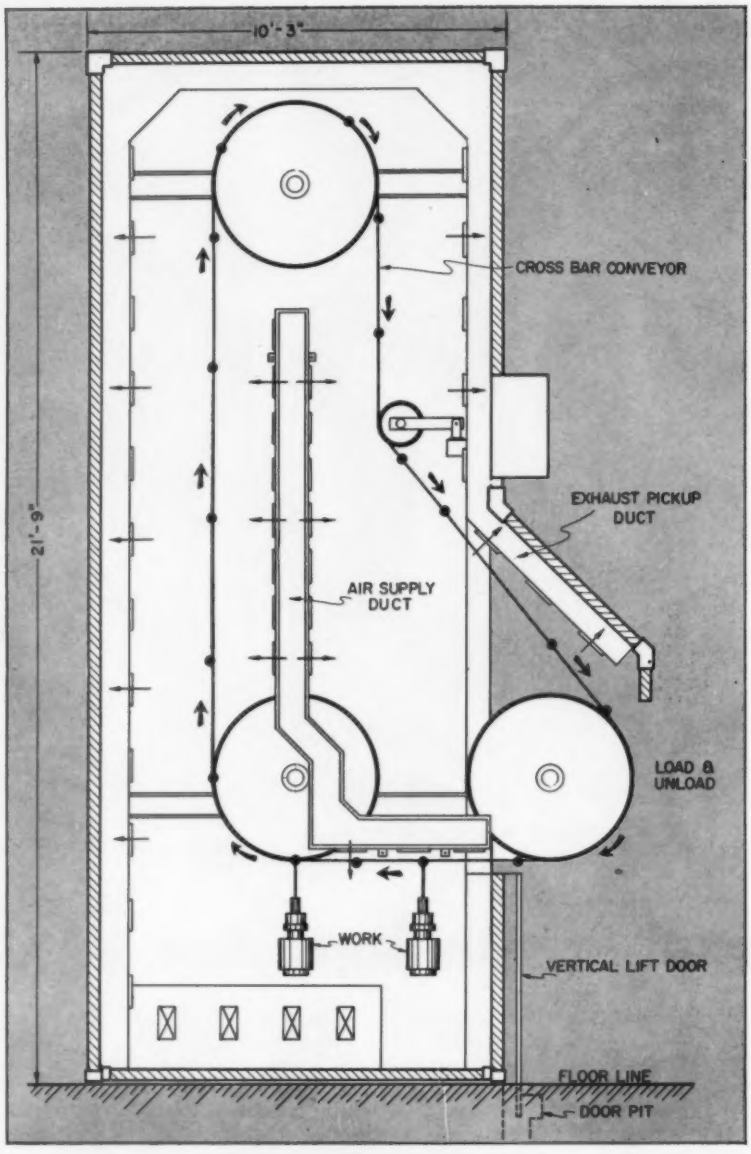


Fig. 4. Exhaust pickup duct near entrance and around exterior wall of furnace assure the complete purging of dangerous gases before the baking cycle starts

The conveyor operates periodically every 15 min until it has reached a total of 16 stations. By means of a counter the number of stations can be varied. After the 16-station travel has been accomplished, a dwell period occurs, varying from 45 min on up to a maximum of 2 hr, at which time the conveyor is at rest.

After the dwell or baking cycle has been completed, the conveyor pulsing timer is restarted to repeat the cycle of 16 stations and the 45-min dwell period. The pulse conveyor timer is started again and the conveyor moves 16 stations once again, and when these 16 stations have been through the cycle at approximately 8:30 p.m., the master timer shuts down all power, turns off the heat and supply and exhaust fans.

Several basic designs were considered in the planning of this operation, but in terms of plant layout, the vertical arrangement of the oven and conveyor were in direct conformity with the most advanced thinking in plant engineering consistent with efficiency and safe operation.

Primary advantages of this complete automatic processing equipment are: 1. Manpower saving; 2. Economical operation; 3. Compact arrangement; 4. Flexibility of operation.

Four of the 48 dockboards are visible in this photo of Ford's pool car terminal where parts are speeded to assembly plants

48 Automatic Dockboards Speed Ford's Handling

IT IS OFTEN POINTED OUT THAT, to be completely effective, a materials handling system must start and end inside the carrier. Slow, time-consuming loading or unloading is wasteful and expensive and, to a great degree, defeats the purpose of usually more up-to-date internal handling systems. The danger of personnel injury and damage to dock-handled materials must be eliminated if the entire plant handling operation is to be as effective and efficient as possible. It was for these reasons that Ford Motor Co. decided to install automatic dockboards in its modern pool car terminal in Detroit.

Actually, in many cases, where internal handling systems are up to date, the dock represents the only place where further savings can be realized. One answer then, is fully adjustable, automatic dockboards. Their wide, smooth, gradual grades afford the fastest possible method of bridging the gap between dock and carrier because handling equipment can operate at normal speeds, safely, in and out of the carrier. This gives confidence to the fork or lift truck operator, and his efficiency is stepped-up knowing that the dockboard cannot bend, break, or slide from beneath him.

To be efficient, a dockboard must be uncomplicated, requiring little or no servicing, simple to operate so that dock personnel is not required for their operation, and long enough so that maximum grades are always below the efficient operating range of the mechanized handling equipment being used. Dockboards chosen by Ford Motor Company for its Detroit pool car terminal work on a patented counterbalanced system, as illustrated.

With this system, the carrier itself supplies the needed power to operate

(Continued on page 242)

When a truck backs into position its bed hits the operating arms and lowers the dockboard to truck's bed level. It automatically adjusts itself to bed level

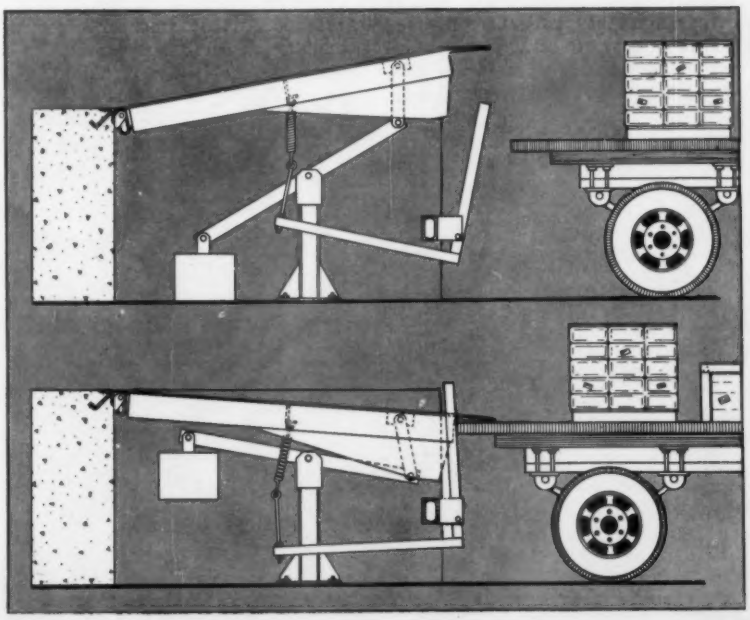


Fig. 1. Silicone-treated block on left shed water quickly; absorbed water darkened other

Masonry Protection With Silicones

Treatment Can Make Above-Grade Wall Surfaces Shed Water

By WALTER J. DUGAN, Silicone Products Dept., General Electric Co., Waterford, N. Y.

ALTHOUGH SILICONES were introduced commercially only a decade ago, they have become quite versatile. They can help the plant engineer do a number of important jobs. One job to which management is giving close attention in these days of increasing construction and maintenance costs concerns the protection and preservation of masonry structures against the relentless attack of the elements. Silicones can provide this protection without detracting from the natural attractive appearance important in maintaining good public and employee relations.

In an ever increasing volume, silicone masonry water repellents are doing a job of protection on brick, mortar, concrete, stucco, limestone, tile, and blocks of concrete, slag and cinders. Since their first broad introduction about six years ago, sales of silicone masonry water repellents by formulators in all parts of the United States have increased about 20 per cent annually and this increasing pattern shows no signs of deceleration.

First, what are silicones? They are completely synthetic materials which are produced in a number of forms including rubber, resins, fluids, emulsions, oils, molding powders and greases. Their varied uses depend on one or more of these common properties: stability at high and low temperatures, inertness, water repellency, good electrical characteristics, excellent resistance to weathering and ozone, and unusual surface characteristics.

In the modern plant, these properties lead to the use of silicones as water repellents, mold release agents, defoamers, high temperature paints, protective creams and ointments for workers, high temperature lubrication, rubber for high and low temperature gasketing and seals, damping fluids, and insulation for all types of electrical apparatus.

The use of silicone water repellents for above-grade masonry is the most important of these applications to the plant engineer today although silicones' performance in high temperature paints for boilers, smokestacks and other "hot" equipment is growing in importance. Produced in solvent or water-based solutions, silicone re-

Table I. Water absorption laboratory test results, average of six specimens

Masonry Material	Exposure Hours	Control	Per Cent Water Absorption	
			2 per cent Solution	5 per cent Solution
Common Brick	24	16.37	0.21	0.00
	168	16.94	0.23	0.01
Fine Aggregate Concrete Block	24	2.42	0.23	0.01
	168	2.58	0.81	0.10
Cinder Block	24	7.39	1.49	0.23
	168	7.21	2.45	0.30

pellents are now available in gallon, pail or drum lots from leading formulators and may be applied with equipment already on hand in nearly every plant.

What do they do when applied to a masonry surface? They provide a colorless, long lasting coating which literally repels water, minimizing the absorption of water which destroys, discomforts and discolors. See Fig. 1. They prevent damage to structures themselves and the peeling and flaking of interior paints caused by moisture working its way into inside walls and surfaces. Their effectiveness is clearly demonstrated in a table of results, obtained in tests by an independent laboratory of a solvent-based silicone, the most popular type. See Table I.

Specimens mentioned in Table I were given a 5 sec total immersion dip with a subsequent drying period of 48 hr. Samples were tested for water absorption by immersion face down into water ¼ in. deep.

Table II lists water repellency of silicone treated masonry before and after 2 months' exposure in an Atlas efflorescence. As Fig. 2 shows, masonry continually exposed to the freezing of absorbed water will be literally pushed apart, chipping and cracking, paving the way to complete destruction. This condition requires prompt attention by the plant engineer because every new opening in the structure is another attack point for the elements which in turn create new defects.

Figure 3 shows the ability of silicones to minimize and in many cases eliminate efflorescence, the unsightly white or yellowish salt deposit on outer masonry surfaces. This deposit results when water penetrates the brick or mortar, dissolving contained salts such as sodium sulphate which in turn leach out and form on the surface. The brick rests in a 10 per cent salt solution. The treated half has not absorbed any of the solution and its surface remains dry and clear; the untreated half has a salt coating.

Another plus of silicone treatment is improved appearance. Because the silicones repel water, they greatly lessen the adherence of dirt which is washed down surfaces during rain storms.

In addition to minimizing the actual damage caused by the passage of water, another benefit of a silicone water repellent is its guarding the natural thermal insulation characteristic of building materials. A dry concrete block, for example, has good insulating performance because of its porosity and the large amount of dead air space it contains. Allow water to penetrate this block and much of its thermal insulating value is destroyed.

Like any protective coating, the silicone water repellent will work effectively only on a sound, properly prepared surface. All mortar in need of repair should be repointed and all holes or cracks larger than hairline should be repaired. Of course, surfaces should be cleared of dirt, loose particles and other foreign matter.

The surface should be dry for the application of solvent-based silicones

(Continued on page 242)

Fig. 2. Freeze-thaw action weakened untreated concrete sample; silicone-treated unit at top was more resistant

Table II. Absorption data indicate the effects of solvent-based repellents

Masonry Material	Per Cent Silicone Solids Treatment	Per Cent Moisture Absorption		Control
		Before Weatherometer	After Weatherometer	
Common Brick	5	0.06	0.00	13.7 Ave.
Concrete Stone Block	5	0.20	1.12	5.5 Ave.
Concrete Slag Block	2	0.54	0.40	4.8 Ave.

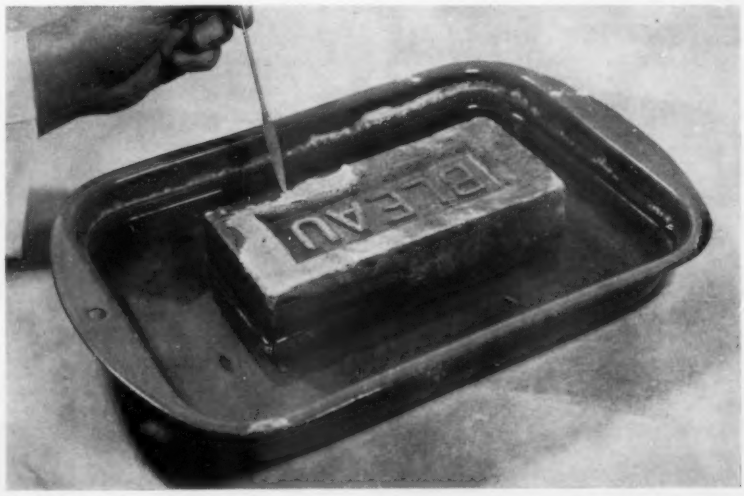
weatherometer. The application and test methods are the same as those for specimens covered in Table I, except for a 40-hr water immersion-absorption test.

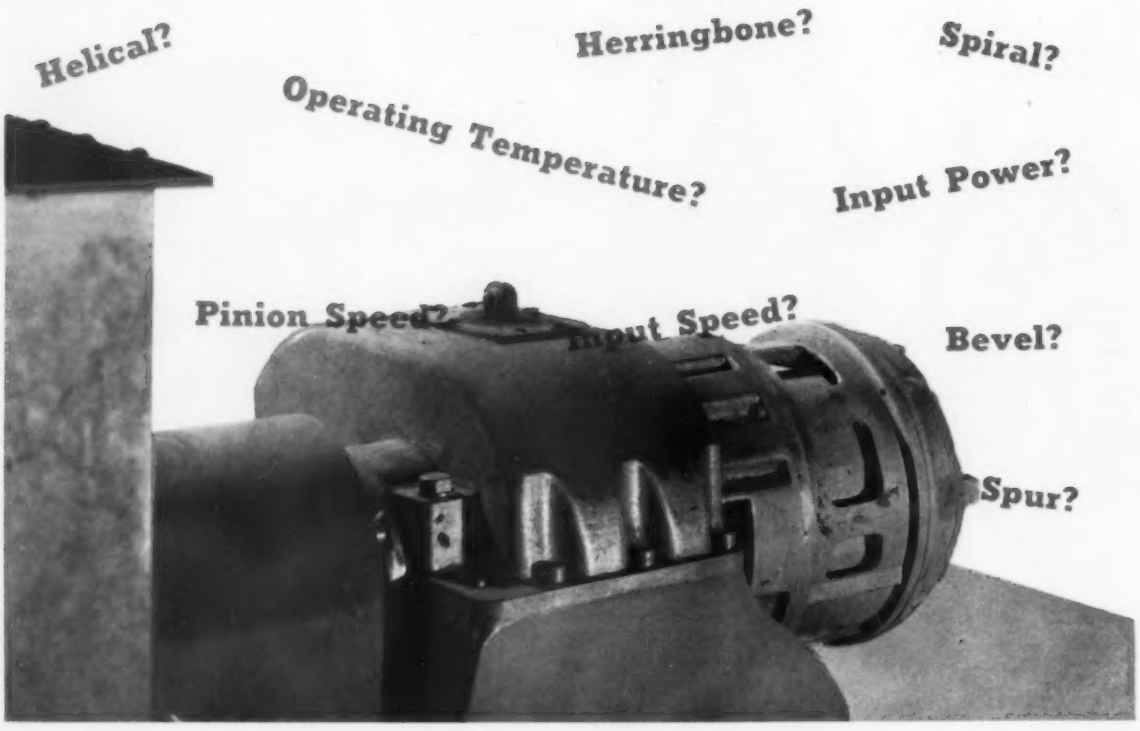
Although it can be seen that the 2 per cent solution is effective, silicone manufacturers recommend a minimum concentration of 5 per cent to obtain the most effective and most durable treatments.

While, as the above tables show, silicones are extremely effective in preventing absorption of water and subsequent damage to interiors, they do not interfere with the normal breathing of a structure, thus permitting trapped or condensed moisture to vaporize and escape. Silicones do not simply form a surface coating which seals water out and vapor in but are absorbed into capillary pores deep into the masonry, providing an enormous silicone-treated area highly hydrophobic in nature.

Figures 2 and 3 illustrate this effectiveness in combating two results of water absorption, spalling and cracking, or freeze-thaw damage, and

Fig. 3. The left half of this brick was left untreated; note the salt deposit





Which Gear Lube Is Right?

These Charts Make Selection of Correct Viscosity Easy

By **BRUCE M. DUNHAM**, Technical Consultant, Industrial Products Department, Sun Oil Company

PLANT PERSONNEL responsible for lubrication and maintenance of gear units sometimes find it difficult to decide what grade and type of lubricating oil is most suitable for their individual gear reducers. Although the manufacturers of gear units generally supply lubrication instructions with new units, these instructions may become mislaid through time and periodical surveys of a large number of miscellaneous gear reducers become difficult unless some sort of reasonable guide is available. Then, again, operating conditions change and with these changes it may be in the best interest of trouble-free operation to change to a more satisfactory lubricant.

There are many variables influencing the proper lubrication of gears, more important of which are: 1. Type of gears, 2. Pinion speed, 3. Ratio of reduction, 4. Operating temperature, 5. Input power, 6. Nature of load, 7. Type of drive and, 8. Method of lubricant application. It is doubtful if plant men take all of these into consideration in selecting a lubricant for each specific gear unit.

In the interest of simplifying selec-

Table 1. Viscosity range comparisons for lube oils listed as AGMA and SAE

AGMA Lubricant Number	Viscosity Range SSU		SAE Viscosity Number (Approx.)	
	100 F	210 F	Crankcase Oil Classification	Transmission Classification
1	180-240		20W	
2	280-360		20	
3	490-700		30	
4	700-1000		40	90
5		80-105	50	90
6		105-125		.....
7 Comp*		125-150		140
8 Comp*		150-190		140
8A Comp*		190-250		250

*These oils are compounded with 3 to 10 per cent of acidless tallow or other suitable animal fats.

tion of proper viscosity for industrial gear units, Chart I and Chart II have been formulated to offer a guide which may be used by plant personnel. These charts are specific for spur, herringbone, helical, bevel and spiral bevel gears *but do not apply to worm or hypoid type gears.* Lubrication of associated bearings has also been considered important in the recommendations for suitable viscosity. Viscosity is plotted against input speed in revolutions per minute. Horsepower and rpm may be observed on the plate attached to each electric motor.

The charts take into consideration as many variables as are practical in a comprehensive chart. These variables include type of gear, pinion gear speed, reduction ratio, and operating temperature. The other variables considered are the method of lubricant application, the character of gear loading and the type of drive unit. Method of application is included because the same type oil would be satisfactory for all methods of application including circulating systems, splash or spray.

Gear Loading Is Considered

The character of the gear loading is also taken into consideration in that the user may select a non-corrosive extreme pressure type oil where a condition of shock loading or extreme pressure is considered to be present. The same viscosity would apply as is recommended for uniform load conditions.

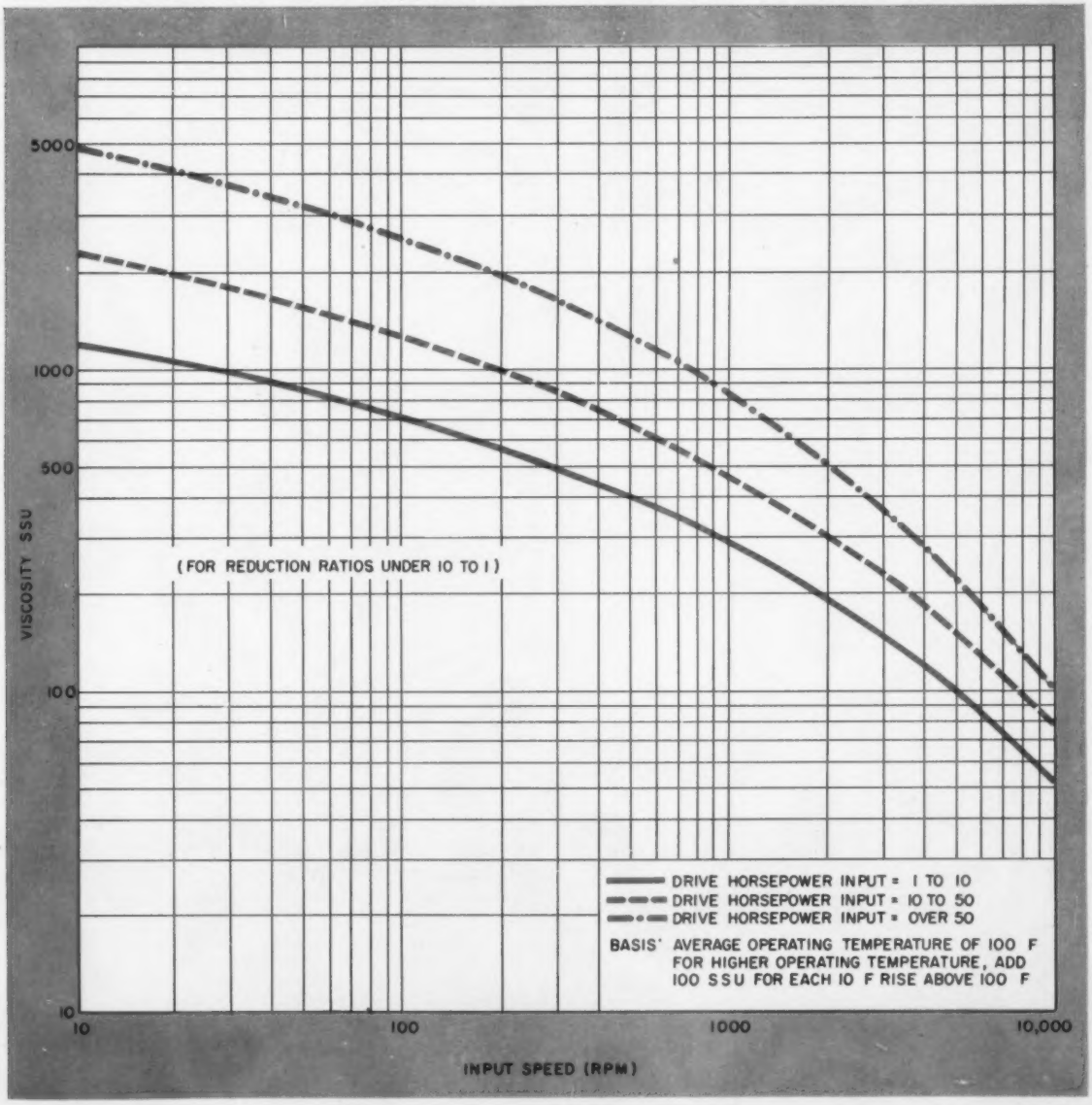
Chart I is to be specifically used where reduction ratios are under ten to one. Chart II should be used where reduction ratios are over ten to one or where multiple reduction units are to be considered.

Example 1

A gear reducer incorporating spur gears has a reduction ratio of six to one. It is being driven by a one horsepower, 1800 rpm electric motor. The oil operating temperature is approximately 100 F and the gears are lubricated by the splash method. The gears are operating under uniform loading conditions.

Follow the vertical line on Chart I at 1800 rpm to the bottom solid line curve (for drive horsepower input of one to ten) and read 210 SSU (Saybolt

Chart I. For reduction ratios under 10 to 1, plotted values of viscosity against input speed show lube oil selections



Seconds Universal). An oil of 200 to 250 SSU would be suitable for these conditions.

Example 2

Assume that it is desired to establish the proper viscosity of an oil to be used in a speed reducer being driven by a 40-hp electric motor which operates at 800 rpm. The gears are of the helical type, lubricated by a circulating spray system and the reduction ratio is eight to one. The average oil temperature is 130 F.

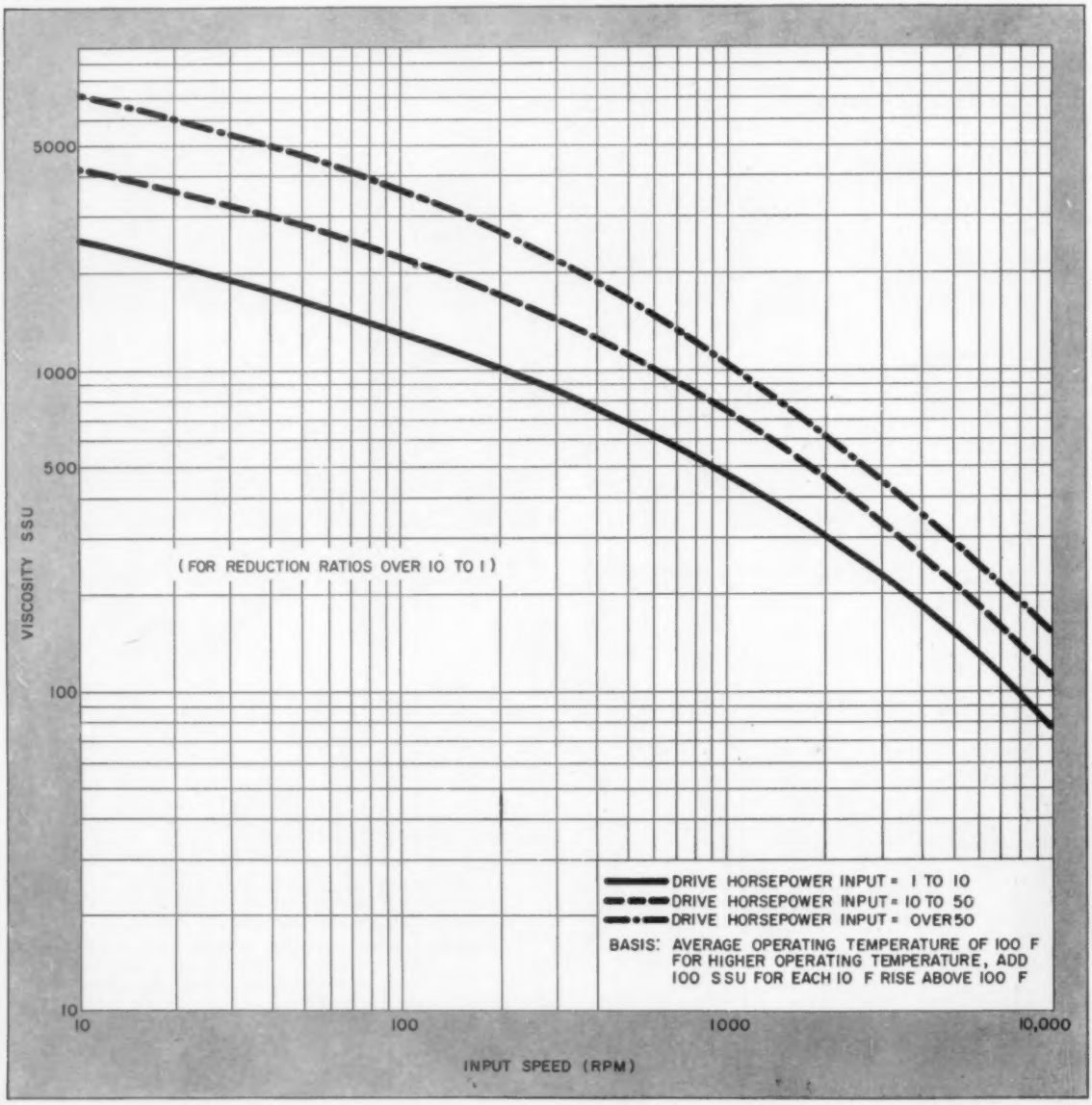
Use Chart I. Follow the vertical line at 800 rpm to the middle dotted curve (for drive horsepower input of ten to fifty) and read 525 SSU. Inasmuch as the oil operating temperature is 130 F (see "Basis" at lower right hand corner of chart), add 100 SSU

for each 10 F above 100 F, or 300 SSU. Adding 300 SSU to 525 SSU read from the chart, the proper viscosity for this set of conditions would be 825 SSU. This means that the user would order an oil having an approximate viscosity of 825 SSU at 100 F from his supplier. This would be an SAE 90 Grade or an AGMA (American Gear Manufacturers Association) Lubricant #4 Type Oil.

If the unit were being operated under uniform loading conditions, a straight mineral oil would suffice. If overloading or shock loading were present, then a mild non-corrosive extreme pressure lubricant of the same viscosity would be required.

Table I offers a handy method of comparing AGMA Numbers with SAE Numbers. Both of these nomenclatures are periodically referred to in selection of gear oils and a cross reference of this type is useful for comparison.

Chart II. For reduction ratios over 10 to 1, plotted values of viscosity against input speed show lube oil selections



John Waligora, new AIPE president, performs first official public act in address at annual luncheon of Institute in Hotel Cleveland during Eighth National Plant Maintenance and Engineering Conference and Show, Jan. 29. Mr. Waligora is chief engineer of Merck, Sharp and Dohme Div.

What's the Future of Plant Engineering?

By JOHN WALIGORA, President, American Institute of Plant Engineers

WHAT IS THE FUTURE of the American Institute of Plant Engineers? Before we can answer that question, we must ask another. What is the future of plant engineering as a profession? Is our profession one which is on the decline, is it holding its own, or increasing its scope?

Let us consider plant facilities and investment which are important measures of the activity and responsibility of the plant engineer. Plant investment per employee is continually increasing. The present average for manufacturing is approximately $12,000 per employee. This is more than double what it was ten years ago. In the chemical industry, it is $19,000 per employee. DuPont has indicated that

"He must not only design and construct most of the new facilities, but he installs the equipment, solves problems of start-up and must maintain it economically."

its average is $25,000 per employee and the figure is even higher in its newer plants. Refineries have an investment of upwards of $70,000 per employee.

Economists are now predicting that almost forty billion dollars will be spent for new plants and equipment during 1957. The plant engineer plays a vital role in our expanding industrial economy. He must not only design and construct most of the new facilities, but he installs the equipment, solves the problems of start-up and he must maintain it economically.

Automation is introducing more complex, more complicated equipment which must be maintained. So much dependence is placed on automatic operation that any interruption to production is serious. The plant engineer

" . . . any interruption to production is serious. The plant engineer has job of making sure the interruptions are few and far between."

has the job of making sure that the interruptions are few and far between.

New equipment requires space, much of which must be air conditioned. It consumes electrical energy, steam, water, or compressed air. It may discharge solid, liquid, or gaseous wastes which must be properly controlled to prevent pollution of either the atmosphere or our streams. These functions most frequently come under the plant engineer.

A new factor, brought about by the tense world situation, has been introduced into the responsibilities of the plant engineer. Industry has the obligation to lead the way in being prepared with a civil defense program. Such a program is not only a necessity in case of a national emergency, but is invaluable in coping with peacetime emergencies, fires, or disasters.

The job of organizing such a plan is one which most frequently falls into the hands of the plant engineer. Most of the program lies within the scope of his normal responsibilities, and he is the most qualified man to do it.

With all these additional tasks, the plant engineer still has the responsibility of performing his job economically. He must make sure that the economies of new plant facilities are not dissipated in excessive down time, high consumption of utilities and unnecessarily high maintenance costs.

This is where the American Institute of Plant Engineers can provide him with real help. It gives him a meeting-ground for exchanging ideas and methods with men who are faced with the same problems. He is able to capitalize on the experience gained by other successful men. A.I.P.E. places within his reach tools that can not be duplicated anywhere with comparable cost and time. The enthusiasm that has greeted the establishment of our new chapters attests to the fact that plant engineers recognize the

"The profession of plant engineering is growing. The AIPE has and should continue to grow with it."

value of meeting periodically and informally in small groups with men who have the same responsibilities.

As our national organization grows, it can further contribute to the development of plant engineers through regional conference, research on some of the problems of plant engineering and towards emphasizing the vital role he plays on the management team. The profession of plant engineering is growing. The A.I.P.E. has and should continue to grow with it.

Series Motor Study—
Fundamentals, Components and Troubleshooting

By ROGER FULLER, Specialty Component Motor Dept., General Electric Co.

PURPOSE OF THIS ARTICLE is to help the electrical maintenance man locate and correct motor trouble when it occurs in series motor parts. In the correction of electrical and mechanical faults, it is often helpful to have an understanding of the principles of motor operation. A brief description of these fundamentals is therefore included here. Series motor parts are usually suitable for operation on alternating current (as found in the average household) or direct current. For the sake of simplicity, this discussion will concern itself with the direct current use of these motors.

Pictured in Fig. 1 is a permanent magnet (N-S with the magnetic field as shown by the arrows). In the air gap of the magnet is a wire, perpendicular to the page of this magazine, in which the current is flowing away from the reader (indicated by the symbol ⊗). Under these conditions, there is a force on the wire that tends to move the wire in the indicated direction. When the direction of the current flow in the wire is reversed, as shown in Fig. 2, (the symbol ⊙ indicates that the current is flowing towards the reader) the force on the wire is in the opposite direction.

A cylinder is shown in Fig. 3. On the surface of this cylinder is wound a continuous coil of copper wire. Iron is used to strengthen the magnetic effects. It is laminated (built up of sheets of iron) to reduce the eddy current losses in the iron.

In Fig. 4 are shown brushes contacting the wires on the surface of an imaginary cylinder, mounted between two electromagnets, N and S. The leads are connected to a direct current power supply. The electromagnets (the field coils) develop magnetism (as shown by the lines in Fig. 4) and current flows in the wires on the imaginary cylinder (rotor or armature) as indicated. The forces on the wires (See Figures 1 and 2) are such that the armature rotates counterclockwise as indicated.

Field Distortion

The magnetic effect of the field, and the magnetic effect of the armature combine to distort the magnetic field. See Fig. 5. Due to this distortion of the magnetic field, it is necessary to shift the brushes about 30 deg in the direction opposite to the direction of rotation, to get top motor performance. For good mechanical arrangement, the brushes are usually located halfway between the field poles. The brush shift is therefore obtained by connections between the armature winding and the commutator bars. In order to reverse this rotation of the motor, either field winding or the armature winding connections must be reversed. It will be observed that the brush shift is now in the wrong direction. Thus, for reversible applications, a neutral setting of the brushes is used or as in impact wrenches the brushes are shifted when the rotation is reversed.

The armature is actually made with slots in the surface, and windings in the slots. Each coil is usually several turns of wire. The commutator is mounted at the end of the armature with one commutator bar at the end of each coil. For heavy-duty applications, the winding in any one slot may be divided into two or three coils, with one commutator bar at the end of each coil. The armature winding is broken up to reduce brush-sparking.

If a brush is contacting two commutator bars it will short circuit the coil connecting the two bars. The coil is generating current which flows through the face of the brush. In order to reduce this current, the brush is made of carbon, a resistance material. For proper performance, it is always best to use the brushes recommended by the manufacturer.

Complete set of series motor parts consists of an armature (rotor), a field (stator) and the brush mechanisms as shown in Fig. 6. These parts are furnished without a housing, and the tool or appliance manufacturer mounts them in his case. Series motor parts are used where high power and

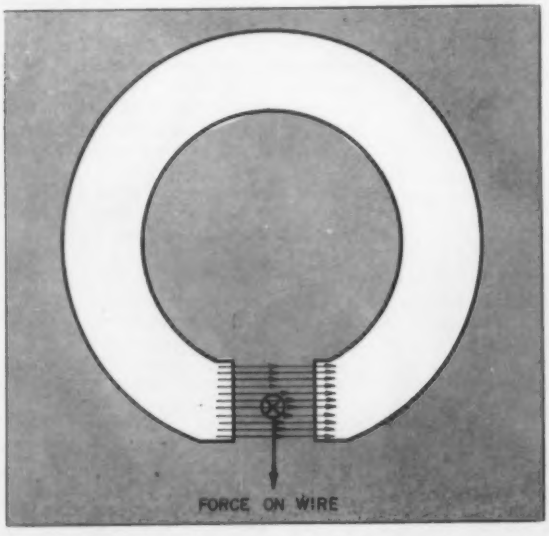


Fig. 1. Force direction, current flowing away from reader

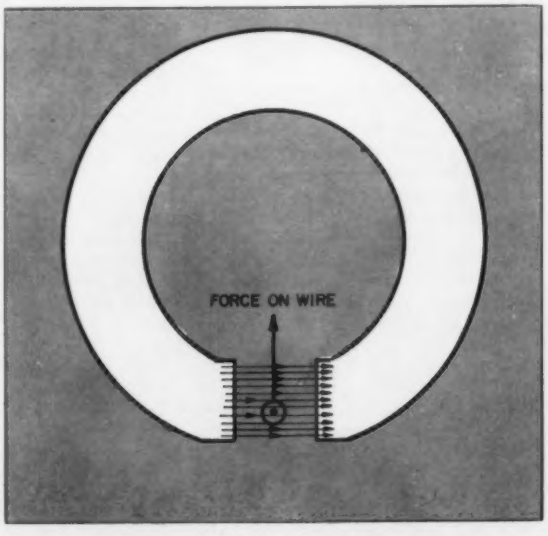


Fig. 2. With flow towards the reader, force changes direction

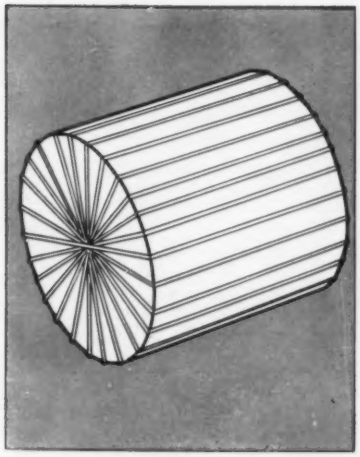


Fig. 3. Continuous winding on cylinder

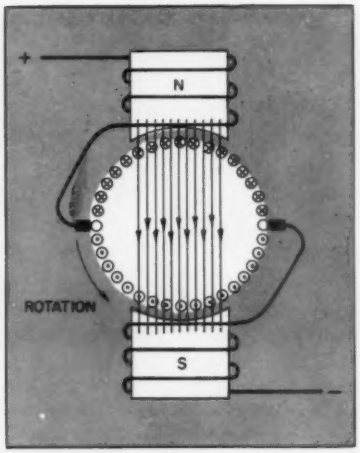


Fig. 4. A schematic concept of a motor

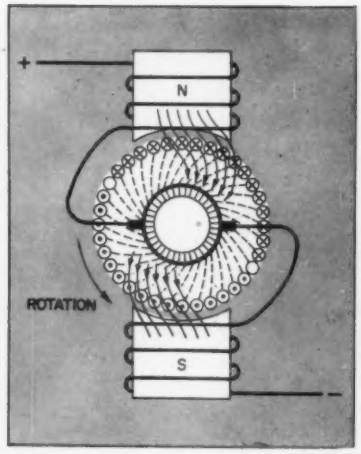


Fig. 5. Distortion affects performance

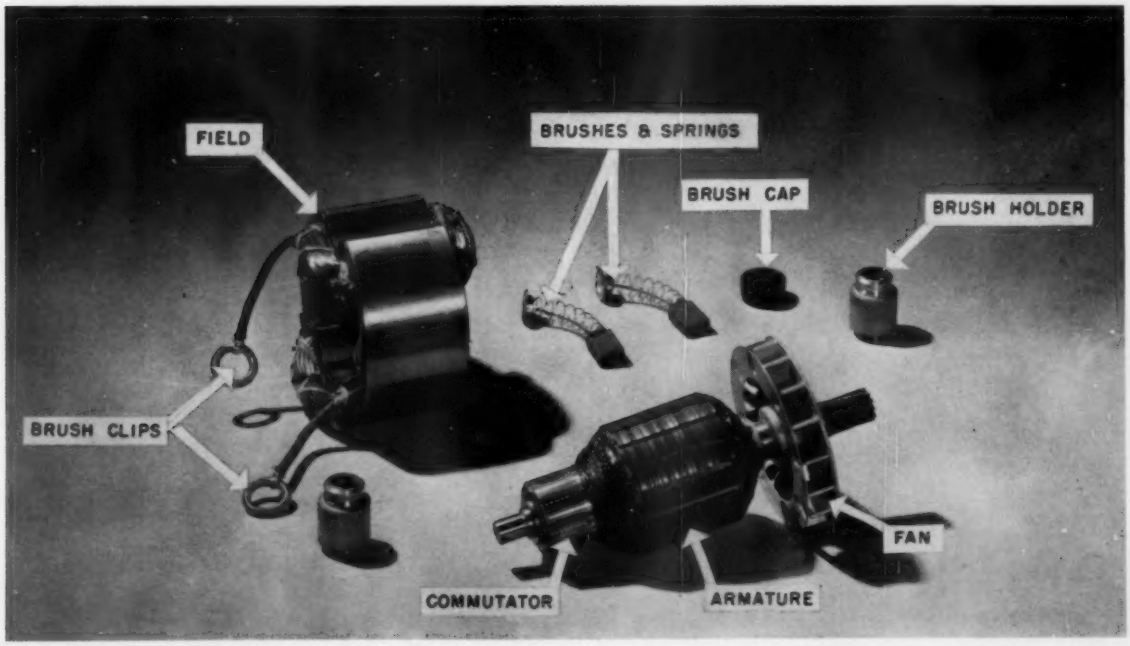
small size are required. With such high power in so small a space, ventilation of the motor is of extreme importance. Motor heat must be removed or the motor will over-heat in a very short period of time. Typical operating characteristics of these series motor parts are shown in Fig. 7.

The following information is based on portable tools. However the principles apply, equally well, to other devices which use series motor parts. When the tool is sent to the service or repair shop, the report of the trouble will give some indication of the faulty performance of the tool. However, many reports, such as "Does Not Run", "Burned Out", and so forth, do not give the service man much information. Before disassembly, look over the tool to see if there are indications of a burned out commutator, burned out windings, or other indications which obviously show signs of failure. If the tool can be operated, it may be advisable to run it to see if there is excessive sparking at the commutator or other signs of distress. If the tool will not run, and all other parts look to be in good condition, there may be a faulty extension cord or switch. Alertness to such things will save a great deal of time.

First step in dismantling a motor is to unscrew the brush holder caps and take out the brushes. Each brush and its respective brush holder should be so marked that the brush can be replaced in its original holder, and in the same position in that holder. A convenient way to do this is to put a (X) mark on the top side of one brush with a lead pencil and a (—) mark on the top side of the other brush. Corresponding marks should be made on the case at the brush holder opening. If brushes cannot be removed without taking out the armature, hold the brushes away from the commutator while removing the armature. Then, carefully remove the brushes and mark them as described above.

Next, unbolt the housing and remove the cover or gear case. The armature may now be removed, taking care not to damage the commutator by scratching or marring. If the outer race of

Fig. 6. Sets of series motor parts such as these can be furnished to tool manufacturer for placement in his own cases



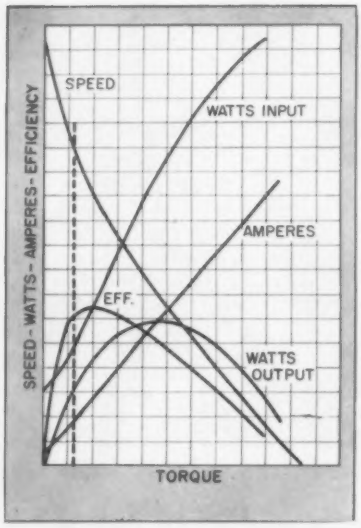


Fig. 7. Performance curves are typical

the ball bearing is held tight in the housing, it may be possible to heat the case, slightly, to expand it, so that the armature may be removed. Do not hammer on the shaft, if the ball bearing fits are tight, as this may damage the bearing or the shaft. Save all washers and thrust springs, and note their sequence of assembly, so that they may be replaced in the proper position when reassembling. In most cases, the bearings will be removed with the armature, and will be held on shaft bearing journals by a tight fit.

Do not remove the bearings from the armature shaft unless they are faulty, and need to be replaced, or unless it is necessary to mount the armature on the journals during the remainder of the repair work. If it is necessary to remove the bearings from the armature, use a steady, even pull on the bearing and, if possible, apply pressure to the inner race, only. If pressure is applied on the outer race, it may damage the bearing by Brinnelling the raceways. (Brinnelling is the term used to describe the denting of the raceways by the bearing's ball, when a bearing is subjected to excessive pressure.)

Before putting a bearing back into use, it should be checked for smoothness of operation. Rotate the bearing by hand, to see if there is any roughness, indicating a Brinnelled race, dried lubricant or other trouble. If the bearing is of the sealed or shielded type, there is not much that can be done in the way of cleaning or relubricating and, if faulty, it should be replaced with a new bearing. Open bearings may be washed with carbontetrachloride or other solvent, and the conditions of the balls and races checked by eye and by feel. If the bearings appear to be in good condition, relubricate with a grease recommended by the tool manufacturer.

In some cases, if the bearing is Brinnelled, it will function satisfactorily if replaced with the same face outward as when it was removed. This is due to the fact that the Brinnelled surfaces of the races are not in use during normal operation of the tool or appliance. When pressing a ball bearing on a shaft, it will be evident that the pressure should be on the inner race, only, to avoid Brinnelling. This can be accomplished on an arbor press with a short piece of pipe, the same size as the inner race.

When reassembling the armature into the housing, make sure the bearing pockets have been thoroughly cleansed. Slight lubrication on the outer races of the ball bearings is advisable to make these parts fit together, easily. Use care in this assembly work, as cocking of the case parts and tightening of bolts may result in Brinnelling.

Armature Faults

Many faults, causing failures of series motor parts, occur in the armature winding. Generally, these will fall into one of the following classes of failures: Burnout, Open Coil, Shorted Coil, or Grounded Winding. Normally, the correction of any of these faults would involve rewinding the armature. It is recommended that armature rewinding should not be attempted unless the shop is equipped with the correct winding tools and there is complete knowledge of the proper rotor treatments and insulations. Armatures requiring this work should be referred to the tool manufacturer for repair or replacement.

Sometimes it might be suspected, before testing, that the armature has failed, when actually the fault lies elsewhere in the motor. However, it is well for the shop to be equipped to locate each of these failures, in order to have positive proof that they do exist. A record should be kept on each armature checked.

The first step in the investigation of any part is to give it a thorough visual examination. Often the failure will be apparent, or at least a clue to its identity may be found. A visual inspection of the armature might reveal the following:

1. Discoloration of core, windings or commutator, indicating a burnout or overheating due to a heavy overload. Overloads may be caused by using too large a drill bit in a drill,

Fig. 8. Typical bridge circuit for checking armature circuits

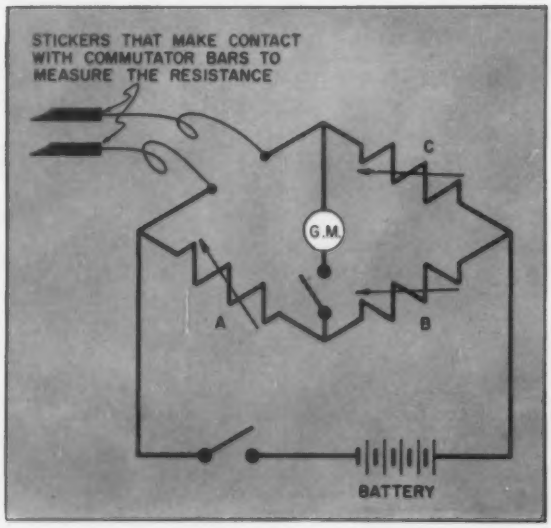
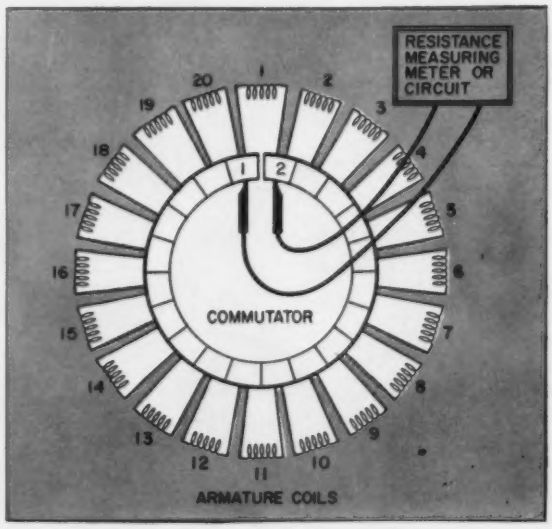


Fig. 9. With no defects, reading is approx coil resistance



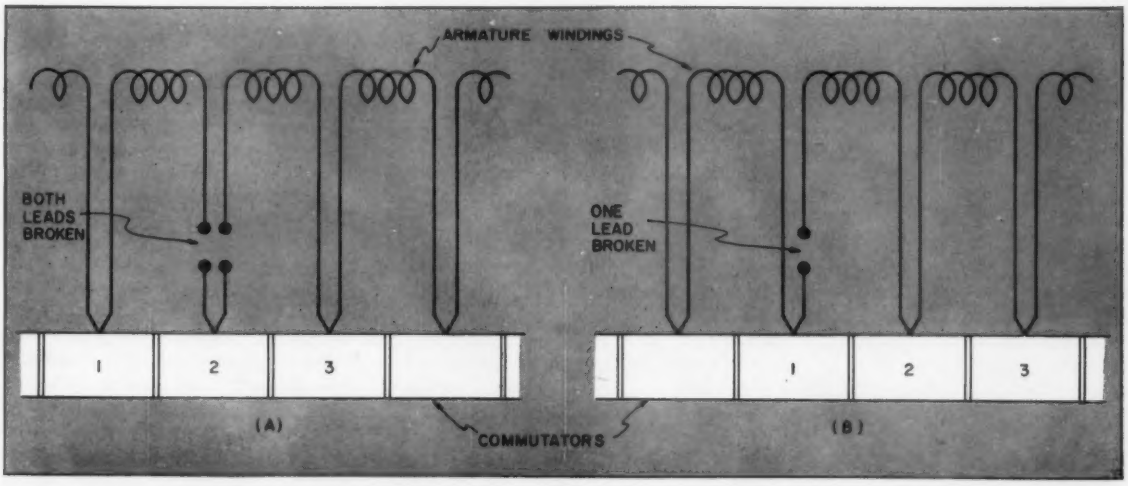


Fig. 10. These are examples of different broken-lead conditions in the armature circuit; text covers their location

trying to cut too fast with a saw, using a dull saw, or one with poorly shaped teeth, and applying too much pressure to a sander or polisher. Burnouts, due to an overloading, should be brought to the attention of the tool manufacturer so that he can investigate the usage of his product.

2. Burned commutator bars, particularly burning on the trailing edge, usually indicates an open circuit in the armature.

3. Solder thrown out of the armature lead connections at the commutator. Evidence of thrown solder may be found on the inside of the housing or on the stator. The absence of solder from these joints is further evidence of thrown solder.

4. A number of commutator bars, burned on the contact surface, possibly indicates one or more of the following: a. Brush not seating properly on the commutator. b. Brush spring pressure not adequate. c. Insulation between bars too high and thus holding brush off commutator. d. Machine overloaded. e. Armature shorted or grounded. f. Field shorted or grounded.

5. Commutator leads torn loose from the commutator and "fanned out" may indicate that a 115 v tool has been run on 230 v.

Open Circuit

Armature circuit opened, this type of fault usually occurs at the point where the coil leads are soldered to the commutator. The breakage is most prevalent in impact tools, sabre saws and other applications, incurring severe shock loading. Usually, the open coil cannot be found by visual inspection unless the motor lacing is removed.

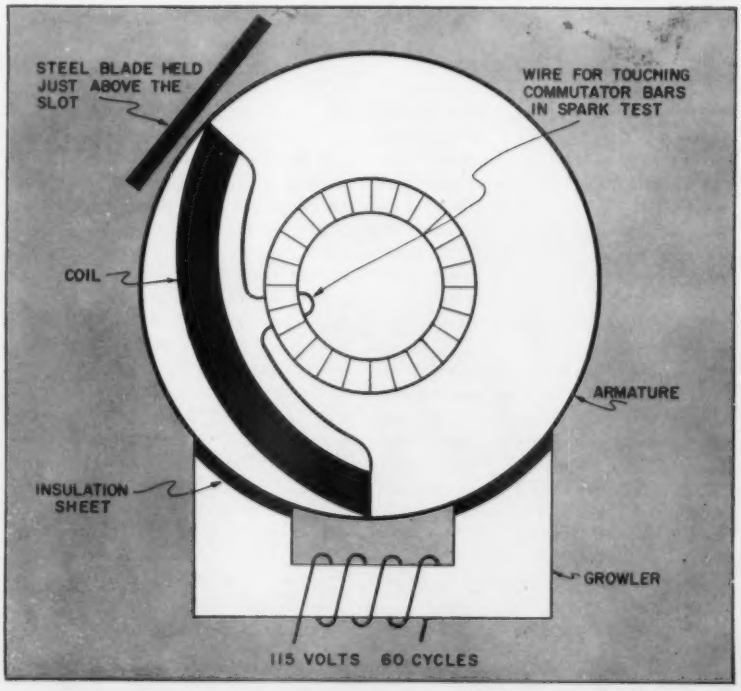
One method of locating an open circuit is with a continuity checker, Fig. 13, which indicates whether or not the winding is broken. Any accurate resistance meter will do the job, but a resistance bridge is probably the most effective method for locating this type of fault. See Fig. 8.

To locate an open coil, place the two "stickers" of the measuring device on adjacent commutator bars and note the meter indication. If the armature has no shorts or "opens", the meter will read the approximate resistance of the coil between bars. See Fig. 9.

Each commutator bar has two coil leads, connected to it, as shown by bars 1 and 2 in Fig. 9. When lead breakage occurs at the commutator joint, it may be at either one or both of these leads. See Fig. 10. Illustration 10A shows an open coil failure where both leads to the commutator are broken, consequently opening two coils.

If the "stickers" of the tester are placed on commutator bars 1 and 2, the tester will show an infinite resistance (extremely high resistance), indicating that both the parallel paths are open. If they are placed on bars 2 and 3, the tester will again read infinite for the same reason. But when the "stickers" are placed on any other two adjacent bars the tester will read the resistance of the single coil connected between those bars. The open

Fig. 11. Illustration shows two approaches for the location of short in coil



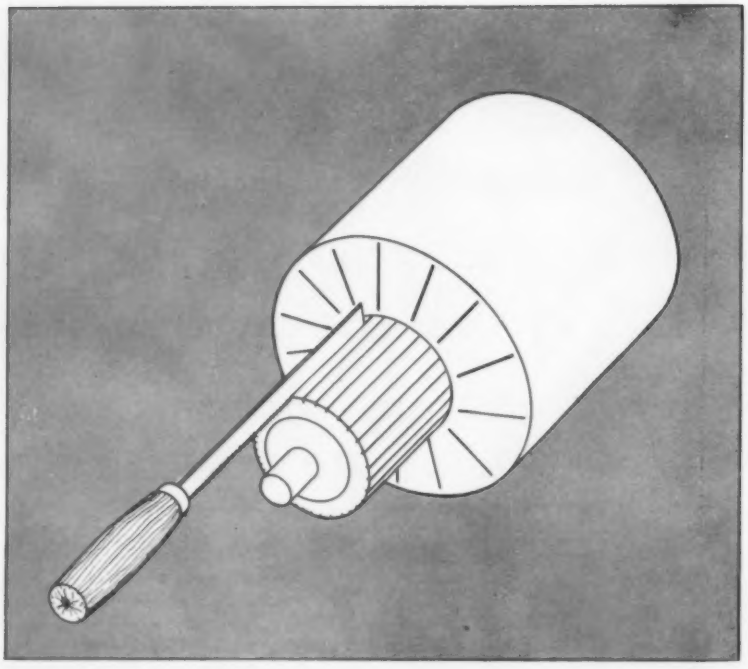


Fig. 12. Method of undercutting motor commutator with a small hack saw blade

coils will thus be the ones connected to the commutator bars which show an infinite resistance on the tester.

Lead break of the type where only one lead is broken is shown in illustration 10B. Let's see how we locate this "open" with the continuity tester. When the two "stickers" of the tester are placed on commutator bars 1 and 2, the tester will read the total resistance of all coils in series from bar 2 around the armature to bar 1. The coil connected between bars 2 and 3 is open so it is not in the circuit.

If the tester is connected to bars 2 and 3, or any two adjacent bars, it will read only the resistance of the one coil connected between those bars. The rest of the coils would be open circuited due to the break at bar 1. Thus, it is obvious that the open coil must be between the bars which show the high resistance on the continuity tester. The above tests for open coils are good, of course, only if there are no other faults in the armature.

It is possible for an armature to have broken wires which make good contact while the armature is at rest and open up only under centrifugal force or heat expansion. These open circuits will obviously not show up on the tester and may be located by visual inspection and deduction from the presence of burned commutator bars.

An armature may develop internal shorts where one coil is shorted to itself or to another coil. This latter type of failure normally occurs at the end turns where the wires of one coil cross the wires of another coil. The voltage stresses are the highest at these points and the end turns are usually under high mechanical stresses due to the compression used to reduce the winding height. The forces are also increased at these points due to centrifugal force when the rotor is turning at high speed.

The accepted method of locating a short is by means of a growler. A growler is simply a laminated iron core shaped to fit the armature and wound with a suitable coil. The rotor is rested on the poles of the growler and the growler coil is energized from an a-c voltage. This combination then acts like a simple transformer with the growler coil being the primary and the armature coils the secondary.

Two tests can be made to locate a shorted coil. First, take a short piece of wire and short out each adjacent pair of commutator bars. If a coil is completely shorted no spark will be produced. The second test is to hold a thin piece of steel (a hacksaw blade or flexible steel rule) near each slot. This blade will vibrate when held over a slot containing a shorted coil. See Fig. 11. The armature is rotated so that each slot lies between the poles of the growler and the above tests are performed for each coil. Normally the winding of the armature is insulated from the core iron and shaft. When current can flow from the winding, due to a fault, to core-iron and shaft, the winding is said to be grounded. Grounds can cause shock to the user, if the tool is not properly grounded. If the winding is grounded in two places a short circuit can occur.

Ground in the armature winding is detected by high potential testing, commonly known as hi-potting. The procedure for hi-potting is to impress a high voltage (usually about 500 v) between the iron parts of the armature and the commutator bars. The meter on the hi-pot stand then reads the voltage between the iron and the winding. If there is a solid ground, the meter will indicate no voltage. If there is some resistance in the ground, the voltage will drop off, but the meter will not read zero. The armature should be replaced if it has either type of ground.

It may be possible to obtain suitable test results by measuring the insulation resistance with a Megger. However, it should be borne in mind that variable results will be obtained, due to the presence of carbon dust and due to variations in moisture conditions.

The commutator of an armature which has failed should be carefully checked for mechanical defects such as insulation between commutator bars being too high, commutator rough, or eccentric, or a brush track worn into the surface. These difficulties may be remedied by undercutting the insulation and turning the commutator down. See Fig. 12. The first step in refinishing the commutator is to undercut the insulation. This may be done with a small, narrow blade circular saw or other suitable tool. The cut should be from 1/32 to 3/64 in. deep, yet wide enough to completely span the insulation slot and cut just a fraction of the bar on each side. After undercutting the insulation, the commutator surface may be refinished by either grinding or turning.

Commutator Resurfacing

It is the practice of the General Electric Co. to diamond turn the commutator while supporting the armature in a fixture which locates on the bearing journals. By turning from the journals instead of the centers, the eccentricity between the centers and journals is removed. When resurfacing the commutator, care must be taken that the tool is not permitted to run all the way back on the soldered portion of the commutator and thereby cut the leads in the slots. It is best to leave a 1/16 in. minimum width with riser on the back of the commutator. The cutting tool should touch the riser only when it is necessary to clean up a resoldered connection.

After grinding or turning, the commutator should be brushed to remove burrs and chips from between the bars. The brush should be stiff enough to

remove the burrs, but not hard enough to scratch the commutator bars. A tooth brush may be used for this job. Instead of a brush, some people use compressed air to blow out the chips.

Brushes also have their story to tell, and careful examination of them may give clues to other difficulties. Motor parts should be inspected, frequently, for worn brushes. These should be replaced before the brush wears down completely to the pigtail.

If the pigtail is exposed, it will tend to hold the brush off the commutator and cause excessive arcing and burning. The protruding pigtail, being harder than the soft brush material, will also scratch and mar the surface of the commutator.

Installing New Brushes

It is much less expensive to replace brushes, at the proper time, than to wait until the commutator is damaged and be forced to resurface it. When new brushes are installed they should be ground or sanded to the shape of the commutator surface, and then inserted in the motor and "run-in" for about 2 hours, at 70 per cent rated voltage (about 80 v for a machine rated at 115 v and about 160 v for a 230 v machine). Since the correct brush is very important for efficient operation and maximum life, care should be taken to insure that replacement brushes and springs are the type recommended by the tool manufacturer. If the underside of a brush (contact surface) is burned, it is an indication that the brush is either stuck or binding in the brush holder, or that spring pressure is not adequate.

If there is side wear or side burning on the brush, check to see if the brush cap is tight, so that the terminal on the pigtail is making good contact with the brush holder. In this case, it is possible that the spring will carry a large percentage of the current. This may cause the spring to become heated and annealed, and consequently to lose it's spring tension. It is also possible that side wear of brushes can indicate that the commutator is eccentric. This can be checked by mounting the armature on "centers" or V-blocks, and checking with an indicator. An eccentric commutator should be corrected by turning or grinding.

Field burnout may be caused by stalling the motor or in other ways overloading it. It may also be caused by a short or ground in the field or armature which would allow excessive current to pass.

Occasionally, a motor, used in a tool which is subjected to heavy vibration, will develop an open field. In a series motor, this naturally causes a complete open circuit and the motor fails to operate. An open field can easily be detected by checking the field current with a continuity checker. A "continuity checker" can be made easily with a small flashlight battery and lamp. See Fig. 13.

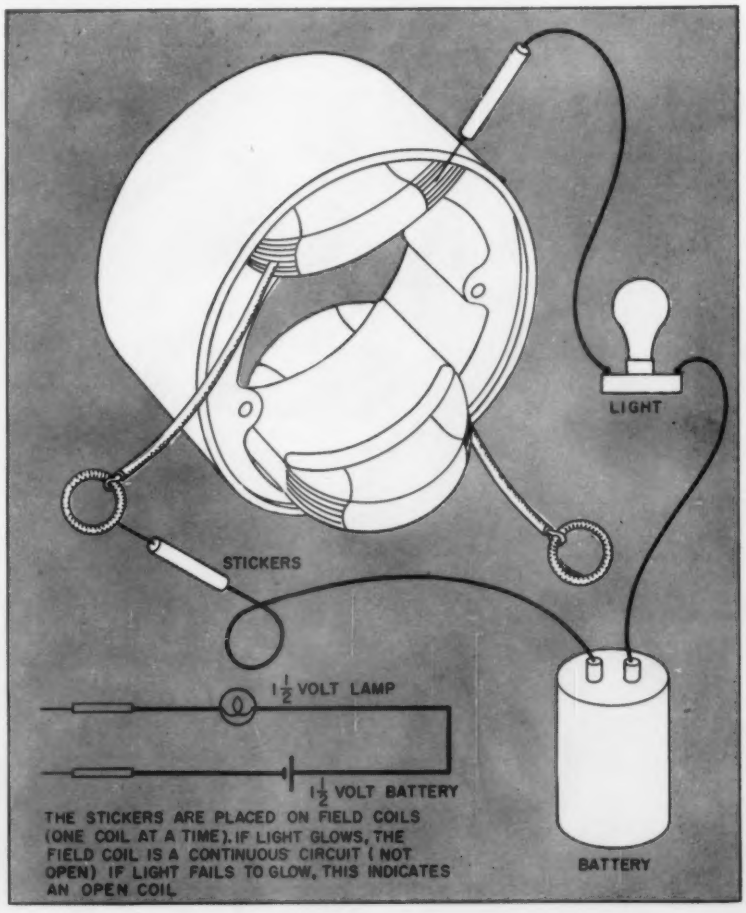
Motors in tools subjected to heavy vibration also may develop grounded or shorted coils. A grounded coil occurs when the wire insulation has been damaged so that the bare wire is actually touching the iron core. This allows the voltage in the coil to be impressed on the core and through this to the tool. This, of course, presents a dangerous situation to the operator.

A shorted coil occurs when different wire turns are in contact with each other, either through two grounded wires or through adjacent wires. This causes the tool to operate less efficiently (more power used to do the job) or to cease operation altogether. Grounds are indicated by hi-potting or continuity checking. A shorted coil may be more difficult to detect, but in general, if evidence of excess heat in the field (such as charred insulation, and discoloration of core) is found, the field should be replaced. This is usually true in both armatures and fields. If a large number of fields of the same design are to be checked, it may be helpful to build a growler to test for shorted turns.

The growler is made by using an armature core from a motor. One coil is wound on this, and is energized with 115 v, 60 cycle power. The field is placed on this growler (before coil is energized) in such a location that the field poles are magnetically energized. The watts input to the growler can be read on a wattmeter and thus good and faulty windings indicated—low watts for a good winding and high watts for a faulty one.

The gear train is a vital link in the proper operation of a tool and the condition of the motor pinion gear, and the mating gears, should be carefully checked. When the armature is first taken from the housing, observe the condition of the gears and lubricant. The gear teeth should be smooth, and no evidence of metal chips or gritty material should be found in them. It is also advisable to check the lubricant for foreign particles.

Fig. 13. Handy dry-cell and light bulb system for making check on continuity


LIGHT
STICKERS
1½ VOLT LAMP
1½ VOLT BATTERY
BATTERY
THE STICKERS ARE PLACED ON FIELD COILS (ONE COIL AT A TIME). IF LIGHT GLOWS, THE FIELD COIL IS A CONTINUOUS CIRCUIT (NOT OPEN) IF LIGHT FAILS TO GLOW, THIS INDICATES AN OPEN COIL

II. Working the Metallurgical Marvel

More Tips for the Plant Engineer's In-Plant Use

Article presents information on a number of methods of welding stainless . . . This is followed by some insight on heat treating and annealing . . . Material on finishing is included also

By RICHARD E. PARET, American Iron and Steel Institute

WELDING is one of the most highly recommended methods of joining stainless steel. Properly made stainless steel welds have good mechanical properties and corrosion resistance. For a corrosive environment, welded joints are preferable to mechanical joints, such as riveted or bolted sections, since there are no adjoining surfaces setting the stage for the action of crevice corrosion.

Stainless can be welded by all methods applicable to carbon steel, except hammer or forge welding. As with all materials, certain techniques should be followed during welding to minimize the effects of heating. Some of the austenitic stainless steels may, under certain circumstances, be subject to an abnormal corrosive attack known as intergranular corrosion.

This may occur after the steel has been heated for some time (either during service or even during welding) in the temperature range of 800 to 1600F, and then placed in a sufficiently corrosive environment. The temperature range is often called the "sensitizing range." Annealing after heating in the sensitizing range, prior to exposure to corrosion, will restore full corrosion resistance to the steel.

Welds made with the austenitic

Fig. 1. Here, the workman is using a special type of torch in welding stainless steel with an inert-gas shielded arc

stainless steels are naturally tough and ductile and require no annealing after welding for use in normal atmosphere or mildly corrosive conditions. If the weld must withstand severe corrosive attack, annealing is recommended after welding, or, if this is impractical, one of the low carbon types should be used for fabrication as these steels are less subject to intergranular corrosion.

If equipment is to be operated in the sensitizing range or if thick, complicated sections must be welded and kept hot for some time, one of the stabilized grades of stainless steel should be used, either types 321, 347 or 348.

In general, the welds made on the ferritic grades are not as tough as those made on the austenitics. Welds made with chromium filler metal are usually preheated and postheated. Frequently, the ferritic grades are welded with chromium-nickel filler metal and used in the as-welded condition. The resulting weld bead is ductile, but a narrow zone on either side of the parent metal may be affected by the heat. It should also be noted that the line of demarcation is apparent on welds made with austenitic filler rods.

Preheating Martensitic Types

Since the martensitic grades will harden on cooling from welding temperatures, thermal treatment is usually advisable. High carbon martensitic types, such as types 420, 431, and 440A, 440B, 440C, should be preheated at 500 F, and promptly annealed after welding. If hardening and tempering follow immediately after welding, post-annealing often can be eliminated.

Lower carbon types such as 403, 410, 414, may often produce satisfactory welds without preheating; however, postheating is recommended.

Since the stainless steels have a relatively low thermal conductivity every precaution should be used to avoid warpage and distortion during welding. The use of suitable jigs and properly designed joints located where they are subjected to the least stress, chill plates held close to the weld zone, and work-temperature reduction will help to eliminate distortion. Also helpful are welding techniques such as skip welding and step-back welding.

Oxy-acetylene welding: Oxy-acetylene gas welding is often employed on light gage, 20 or under, stainless steel sheets; it is not as satisfactory on heavier gages. A slightly reducing flame, uncoated rods with a diameter approximately equal to the thickness of the sheet, and flux are usually recommended.

Edge spacing varies according to the sheet stock thickness; over 14 ga, space should equal the thickness of the stock; between 16 and 20 ga, butt the edges; under 22 ga, flange to height of approximately 1/16 in. and use no filter rod. A knitting back and forth motion and thorough penetration accomplished in a single pass is the best technique for gas welding.

Fig. 2. Spot welding can produce joint efficiencies in excess of 90 per cent

Metal arc welding: Metal arc welding has in general proved more satisfactory than gas welding stainless steel, particularly for sheets 20 ga and heavier. Flux-coated, low carbon, high-alloy content rods are usually used. Work should be free of scale, grease and dirt to prevent contamination, and held in suitable jigs and clamps, and cooled by copper chill bars to prevent distortion.

Welding current may be alternating or direct and is usually 20 per cent less than would be ordinarily used for mild steel. If direct current is employed, reversed polarity (electrode positive) will produce a more satisfactory weld.

Carbon arc welding—without filler rod—is not generally recommended, since carbon pick-up from the electrode cannot be entirely eliminated.

Inert-gas shielded arc welding: This system is marketed under several trade names and is highly recommended for stainless steels, especially in the thinner gages. The inert gas atmosphere prevents alloy oxidation and eliminates the need for flux. Either argon or helium is used as a shielding gas, the choice depending on the desired welding characteristics.

Either direct or alternating current may be employed. Straight polarity (electrode negative) is the preferred current flow for d-c use. Electrodes for light gage work are tungsten, carbon having been found generally unsatisfactory; for some heavy gage work, metal rods or filler metal are used.

Atomic-hydrogen arc welding: Using two tungsten electrodes and an atmosphere of hydrogen, this method has proved to be very successful in welding light gage, irregularly shaped

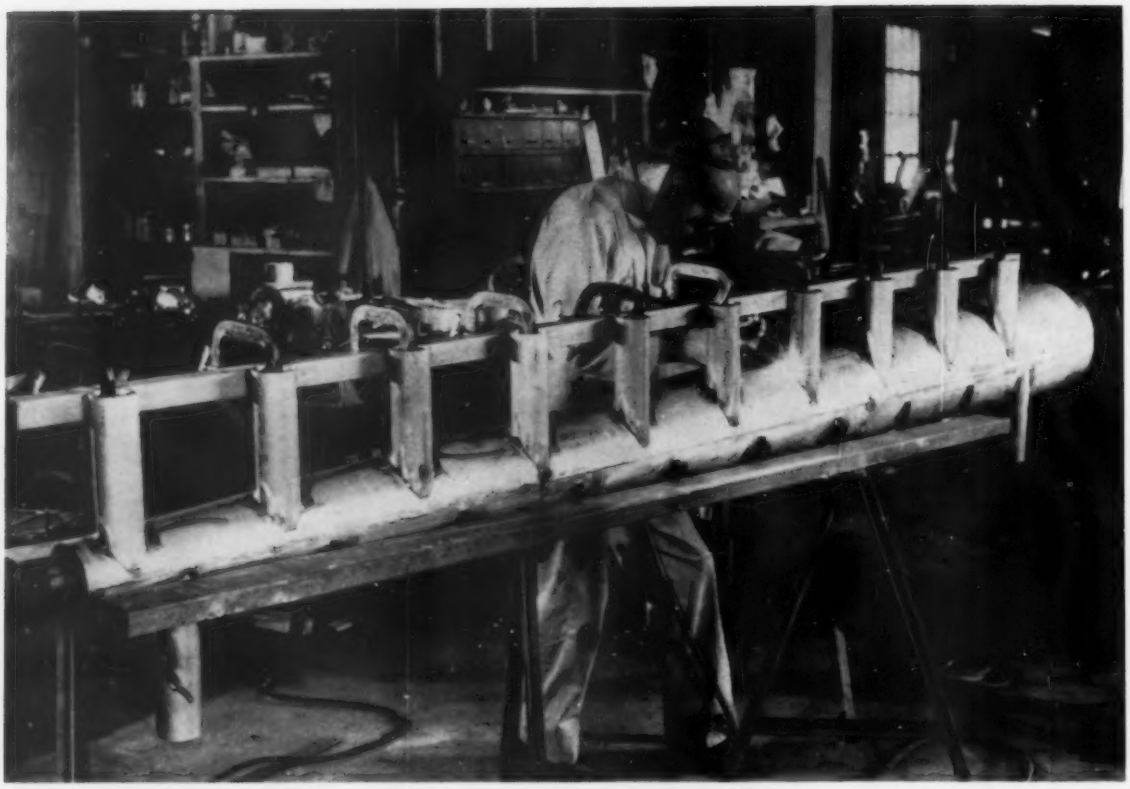


Fig. 3. Tapered stainless steel header fabricated of type 304, ⅛-in. thick stock; type 308, 1/16-in. dia filler rod was used

sections of stainless steel. Heat control is accurate, no flux is required and alloy oxidation is prevented by the reducing atmosphere.

Submerged-arc welding: More suitable for production than for occasional jobs, submerged-arc welding is highly effective when welding stainless steel. Both automatic and semi-automatic machines are available. Because the arc operates under a heavy layer of molten slag, it is possible to employ exceptionally high welding current and thus realize very deep penetration at high speed. Because of this deep penetration, filler metal should be of a high alloy content—for example type 310—when welding stainless steel to mild steel. Proper adjustment of the welding machine is important in controlling depth of penetration and contour of weld.

Spot welding: Spot welding equipment, available in both portable and stationary tools, provides sound, ductile welds which, in applications where lapped joints are permissible, are often more economical and tougher than riveted joints. In fact with stainless steel it is possible to obtain a joint efficiency in excess of 90 per cent as compared to an average of 60 per cent in a riveted joint.

Equipment manufacturers' recommendations should be followed closely. The very ease of spot welding sometimes invites carelessness. Weld time, pressure and current variations, should be kept to an absolute minimum.

Seam welding and roll spot welding: Seam welding will produce strong, ductile, air- or water-tight seams in stainless steel. Roll spot welding will produce a spot weld joint quickly and economically. In both cases, the equipment manufacturers' recommendations should be followed closely. Current "on time" should be as short as possible and roll speed carefully determined.

Heat Treating and Annealing

None of the austenitic stainless steels is normally hardenable by heat treatment. High strength is obtained by cold working this group. Normally, however, the austenitic stainless steels are used in the annealed condition. The metal then has the greatest resistance to corrosion, and is also very ductile.

Most austenitic stainless is supplied by the primary producer, already annealed. If in fabrication the material is cold worked to an undesirable extent, the piece can be annealed by heating to a range of 1750-2100 F followed by rapid cooling.

Caution: Remove the lubricating compound before heat treatment; if it remains on the surface it may cause a serious etching attack on the metal, or carburization and subsequent reduction of corrosion resistance.

Ferritic stainless steels require moderate temperatures only for process annealing and stress relieving. Treatment of the medium chromium ferritic stainless steels differs somewhat from that of the higher chromium steels.

For type 430, with 14 and 18 per cent chromium, and for other ferritic stainless steels of the medium-chromium type, maximum ductility is obtained by holding at 1400-1550 F until the metal is heated through, followed by rapid cooling. This, of course, requires that the whole piece be annealed. When this is not possible or practical, heating the work to a dull cherry red using a blowtorch, followed by rapid cooling in air, will usually be satisfactory.

For type 446, with 23 to 27 per cent chromium, heat the piece through at 1500-1650 F—then cool rapidly. Quenching is desirable.

Martensitic stainless steels can be heat-treated to high strength and toughness. For the highest mechanical properties, the piece should be heated to 1700-1950 F and quenched in oil. Because of the low thermal conductivity, it should be heated slowly and carefully to proper temperature.

Where oil quenching may cause cracking because of intricate or complicated design, air cooling may be used. Hardening must always be followed by stress relieving or tempering at 400 F or higher, depending on the desired properties.

In working the martensitic stainless steels, some method of relieving stresses and increasing the ductility and toughness may be desired. The work should be annealed in a muffle-type furnace, since direct contact with a flame for any length of time is undesirable. Heat the piece uniformly and slowly to 1550-1650 F and soak thoroughly. Furnace cooling to 1100 F followed by air cooling is recommended. If air-cooled, the metal piece should not be heated above 1400 F.

Finishing

Requirements for finish on the stainless steels vary widely. The following sheet surface finishes can be supplied by the primary producer. However, the appearance of a particular type of finish may vary somewhat with the different types of stainless steel owing to the different inherent characteristics of the materials.

A No. 1 sheet finish (hot rolled, annealed, and pickled) is used chiefly in heavier gages for industrial applications. It is rarely used as a basic raw material for subsequent polishing or buffing, except in cases where forming and annealing would destroy higher mill finishes.

Sheets with No. 2 finish are cold rolled before final annealing and pickling, and, as a result, have a much better finish than No. 1. Sheets with this finish have a compact, dense surface and maximum ductility and drawing quality. Its use is specified for most products that are to be buffed or polished after severe forming operations where no annealing will be involved. Finish No. 2B is produced by a final light cold rolling. It has a bright, dense surface of slightly harder temper than No. 2D.

Surface Grinding

To produce a No. 4 finish, the sheet surface is ground in stages with successively finer abrasives. The result is a uniform bright finish with good luster. It is suitable for moderate forming operations where the original finish will not be destroyed or otherwise require refinishing.

Tampico-brushed finish No. 6 has a dull matte appearance with uniform, delicate, velvety texture. This satin finish is the result of both polishing and subsequent brushing. Number 7 finish is a highly polished, semi-mirror-like surface, more brilliant than that of finish No. 4.

All the stainless steel should be protected during fabrication. Plastic coatings, which can later be peeled off or removed by solvents or even paper glued to the metal provide protection when handling or laying out the work. Paper or felt under hold-down pads, adhesive tape on the edges of brakes, and ample lubricant when drawing will reduce surface marking.

Grinding, polishing and buffing stainless steel presents problems different from those encountered in handling other steels and non-ferrous metals. Since they conduct heat away more slowly than other steels, special precautions should be taken against overheating stainless steels.

Never use wheels or buffs that are contaminated with other metals. These metals may become imbedded in the surface of the stainless, causing stains or streaks.

Do not use buffing or greasing compounds containing iron oxide. Specify iron-free or iron-oxide-free compounds for buffing stainless steels. Many special buffing compounds are available commercially.

Stainless is also finished in many other ways, including darkened oxide finishing, electroplating, electrolytic polishing, and painting. But, generally speaking, for maximum corrosion resistance, it's best not to add any coating to stainless.

Fig. 4. Portable, air-driven grinding wheel is handy for smoothing operations

Plant engineers attending the organizational meeting in Newark, Ohio, on January 15th, were: top row, l to r, R. Miller, Continental Can Co.; H. Youngquist and Frank Ferrell, both of Owens-Corning Fiberglas Corp.; A. Randell, Continental Can Co.; W. Rice, Scioto Provision Co.; H. Willoughby, Owens-Corning Fiberglas Corp.; W. Emery, Rockwell Spring & Axle Co.; and P. Gaulke, Newark Stove Co. Bottom row, l to r: D. Hoskinson, Rockwell Spring & Axle Co.; J. R. Thumm, Owens-Corning Fiberglas Corp.; J. St. Andre, Kaiser Aluminum & Chemical Corp.; R. E. Keller, Holophane Co.; A. L. Leiser and W. R. Bloss, both of Kaiser Aluminum & Chemical Corp.; L. R. Morris, Denison University; and R. L. Marinello, Plant Engineering magazine. J. St. Andre was appointed temporary chairman

Two New Clubs Formed in Single Day

Newark, O. and Wilmington, Del. Join List of P. E. Societies

Another organizational meeting, held in Wilmington, Delaware, on the same day was attended by: standing, l to r, W. Ash, Doeskin Products, Inc.; F. T. Dianich, B-O-P Div., General Motors; G. Hammer, Pusey & Jones Corp.; C. Starrett, National Vulcanized Fibre Co.; L. Atwell, Defense Div., Chrysler Corp.; D. Rayner, Atlas Powder Co.; R. Barker, Bond Crown and Cork Div., Continental Can Co.; P. G. Damm, Merck Sharp and Dohme, (Valley Forge Chapter, AIPE); R. E. Robbins, Experimental Station, E. I. du Pont de Nemours & Co., Inc. Seated, l to r: J. M. Clark, Pusey & Jones Corp.; H. Spinell, Serling Div., Allied Kid Co.; V. DeLack, New Castle Div., Allied Kid Co.; H. E. B. Anderson, Plant Engineering magazine; J. M. Waligora, Merck Sharp and Dohme, (Philadelphia Chapter, AIPE); J. M. Dooley, Joseph Bancroft & Sons Co.; W. Stone, Electric Hose & Rubber Co.; L. Crew, Congoleum-Nairn, Inc.; and R. N. Loftman, Stine Laboratory, E. I. duPont de Nemours & Co., Inc. Mr. Dooley was appointed temporary chairman

Operation Integration:

Blaw-Knox Builds a Plant

Shrinking three complete plants into three buildings isn't easy . . . New tools, new ideas and plenty of planning did the job . . . Article picks out high spots in planning, design that contributed to success

Fig. 1. Storage tank highlights service area of plant. Propane storage at right, utility building at left. Water in tank is heated to prevent freezing. Extensive parking area in foreground is available for future expansion of main buildings

JUST ONE YEAR and one day after the alfalfa was cut from the site on which one of the construction industry's most modern manufacturing plants was built, the first piece of road building equipment came off the line of the new Blaw-Knox plant at Mattoon, Illinois.

The move to Mattoon was executed as a part of the basic plan to integrate production facilities of the company. Prior to the construction of the new plant, road building equipment was manufactured at Elyria, Ohio; Nunda, New York; and Blawnox, Pennsylvania.

In addition to building a plant and tooling it, the company relocated a sales and production cadre of 54 families, and recruited locally to fill the 360-man work force.

Timetable on the plant featured these dates: April 19, 1955, ground broken; September 15, 1955, first machine tool set: October 15, 1955, sales and engineering personnel

Fig. 2. Thirty thousand gallon propane storage tank. Receiving station unloads railroad tank cars. Mixing station at end of tank is equipped to adjust fuel mixtures when plant burns propane rather than natural gas ordinarily used

Fig. 3. Multiple-duty column carries emergency lighting and gas supply lines, is pre-drilled to fasten future crane support

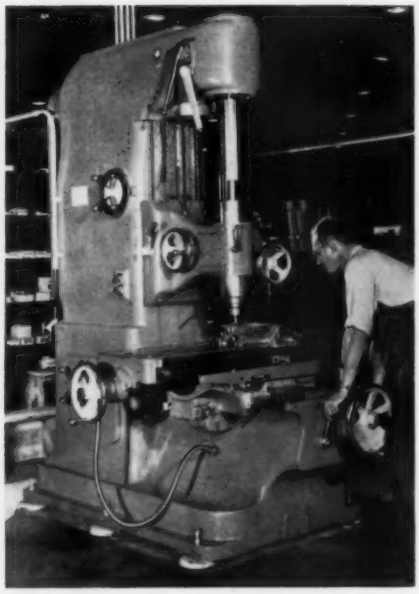


Fig. 4. Mounted on leveling machinery mounts, all plant tools are readily relocated

moved to Mattoon; October 29, 1955, first production piece made in machine shop; January 16, 1956, Parts & Service Department moves to new plant; April 20, 1956, first all-Mattoon-made machine produced.

Three major buildings are incorporated in the design: Administration, Production and Parts & Service. Total area under roof is approximately 250,000 sq ft, with 38 acres of land available for expansion.

According to Paul J. Wolfert, General Sales Manager of Blaw-Knox Construction Equipment Div., about 800 tons of spare parts were packed, shipped, unloaded and binned in the 37,000-sq ft Parts & Service Department.

Design and production features of the new plant are shown in the photographs on these pages. Even the water storage tank has its "specials"—a heater in the maintenance shop at the base of the tower keeps the water in the

Fig. 5. Electronically-controlled multiple tracer burner cuts parts

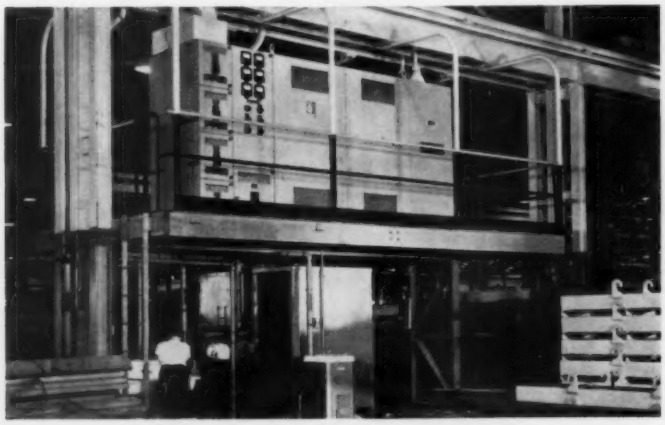


Fig. 6. Overhead platforms carry transformers, provide space below for installing wash stand, hand dryer, urinal and drinking fountain

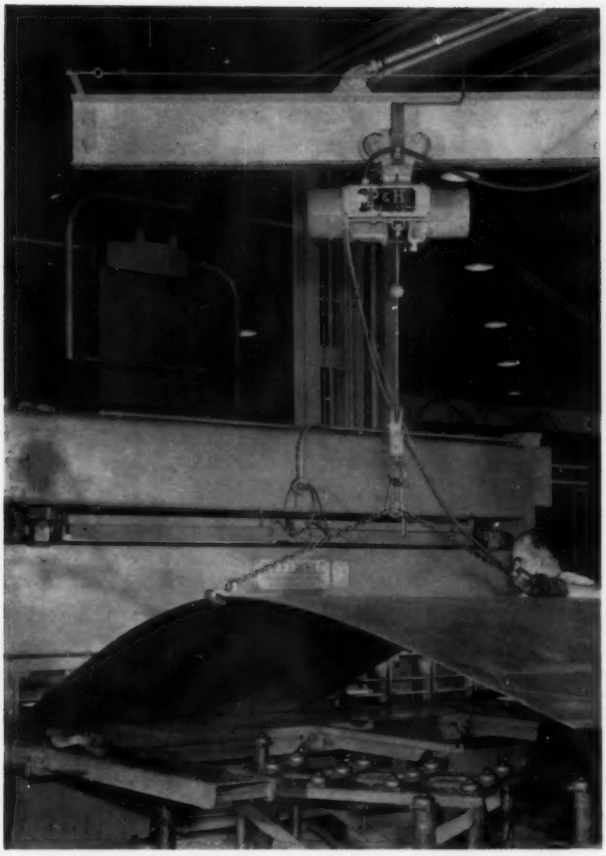


Fig. 7. Materials handling planning in practice. Jib crane drops sheet on roller-topped table, and operator can handle it himself

Fig. 8. Typical mercury lamp fixture shows compact arrangement of lamps and ballasts

Fig. 9. Quick-change chucks on drill presses speed work on standard pieces

tank at a temperature that prevents its freezing in the tank or in the pipes, and a tap near the top of the tank makes the top 25,000 gallons of the total 125,000 gallons available for plant process use, in case the city supply should fail.

A mixer at the gas house provides for changeover from natural gas to propane standby fuel, without having to change the burners in the unit heaters which heat the production areas. The changeover itself is manual, but the gas mixer controls take care of the adjustments in fuel mix that are necessary.

Main columns in the plant, 10WF33, are pre-drilled to receive bolts holding crane supporting columns, 8WF24, in those bays where cranes are used. Pads and anchor bolts are provided in the foundation to receive the column, should an additional crane be needed.

Mounting the great majority of the machine tools on

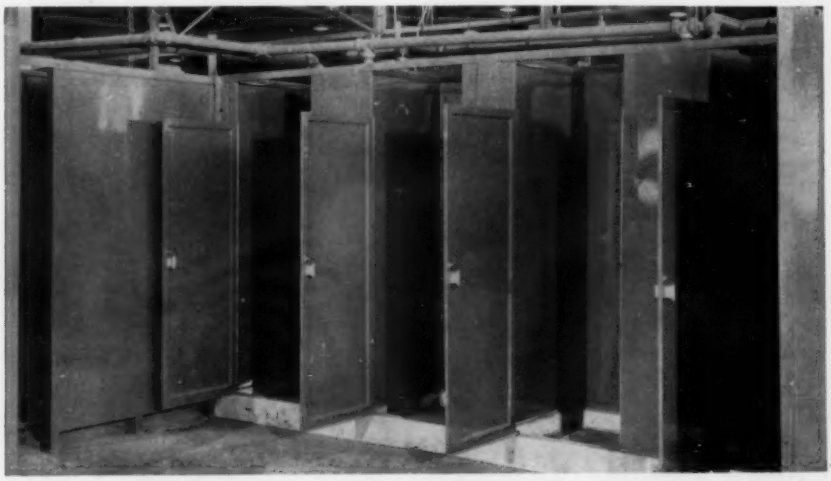


Fig. 10. Only major wash-up area on production floor is this group of four shower stalls used by paint shop personnel

Fig. 11. Plant's two major toilet and washroom areas are located below floor level, leaving production areas flexible

Fig. 13. Palletized castings, self-dumping scrap hopper and overhead crane cut handling costs

Fig. 12. Medical facilities provided include this first aid room, two private examining rooms

Fig. 14. Folding doors accommodate crane rail. Depressed truck entrance, adjustable ramp facilitate parts loading

Barry mounts, which level the tool and hold it without anchoring to the floor, provides a high degree of flexibility.

Transformers in the electrical distribution system are mounted above the production floor, to conserve space, and "comfort stations" comprising wash stand, urinal, hand dryer and drinking fountain, are located under each of the transformers. The two major toilet and washroom areas are located one floor below the production areas.

The maintenance building, a separate building located some distance from the main building (for expansion purposes) is divided by function into several departments. Among these departments are the carpenter shop, garage, paint area, yard tool and equipment repair, pattern and lumber storage, battery charging area, gas truck servicing area, and a boiler room where the water is heated for storage in the elevated tank.

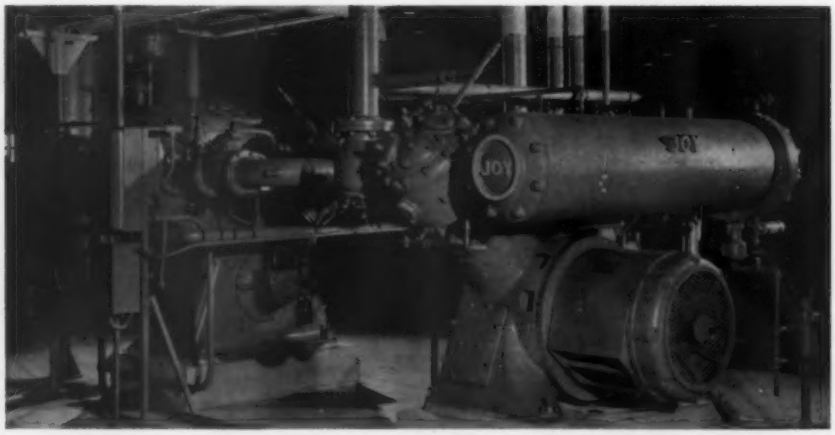


Fig. 15. Centrally-located compressor station supplies air to entire manufacturing area. Location was chosen to facilitate machine moves with minimum relocation of air lines

Is Pump Performing at Capacity?

Here Are Examples of Several That Didn't and Reasons Why

By IGOR J. KARASSIK, Worthington Corp.

THERE ARE A number of reasons why a pump may not be operating at rated capacity. In some cases, it could be that air is leaking into the pump, or the speed may be too low, or the suction lift may be too high, or possibly the discharge head is higher than anticipated.

Each pump application has its particular problems. Here are several examples of where the pump was not operating at rated capacity and the reasons why.

Question: We have two two-stage centrifugal pumps, rated at 250 gpm and 400-ft total head, driven by 50-hp electric motors. They pump cold water into an overhead tank against a 273-ft head. Each pump has its own intake under a 10-ft positive suction head. The two pump discharges are connected to a single header.

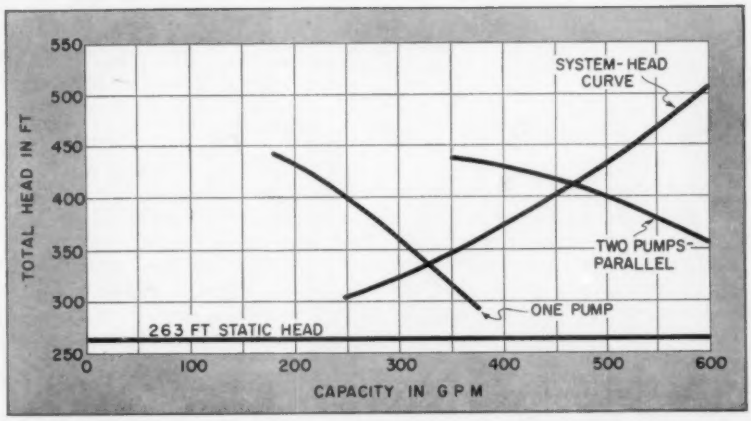
When running alone, each pump discharges 330 gpm at a pressure of 150 psi, but when operating in parallel, the total capacity delivered is only 465 gpm at 180 psi. Why do these pumps deliver so much less capacity in parallel and what must be done to restore them to their rated condition?

Answer: A careful analysis will show that there is nothing radically wrong with these pumps and that they are practically in the same condition as when they were new.

Two pumps operated in parallel will deliver against any given total head the sum of their individual capacities at that head. Thus, if each pump was designed for 250 gpm and 400 ft, two such pumps in parallel will deliver 500 gpm at 400 ft, assuming that the pumps have met their guarantees and have not lost capacity through wear.

This does not mean, however, that two pumps in parallel will deliver through a given piping system twice the capacity that either of them can deliver alone. It is a characteristic of centrifugal pumps operating in a hydraulic system that the capacity delivered will correspond to the intersection of the pump head-capacity curve with the system-head curve.

We can construct both these curves (see illustration) from the information given in the question. In carrying out these calculations, it has been assumed that the 273-ft head referred to is the static discharge head, that the friction losses in the suction piping are negligible and that the 150 and 180 psi referred to are discharge pressures. It is further assumed that the pumps meet their rated design guarantees of 250 gpm at 400-ft head.



Based on the facts in the question, head-capacity and system-head curves have been plotted on graph. The two pumps operating in parallel intersect system-head curve at 465 gpm and a total head of 410 ft, each delivering 232.5 gpm

On this basis, we can develop two points on the pump head-capacity curve, namely the design point and the total head at 330 gpm, since this last is equal to (150 x 2.31) — 10 = 336.5 ft. We can likewise establish a system-head curve, since we know that the total static head is 273 — 10 = 263 ft and, therefore, that the friction losses at 330 gpm are 336.5 — 263 = 73.5 ft. Since friction losses can be assumed to vary as the square of the capacity, we can tabulate data at several arbitrary flows and plot a system-head curve:

Capacity (in gpm)	Friction Losses (in ft)	Total System-Head (in ft)
250	42	305
300	61	324
330	73.5	336.5
400	108	371
500	168	431

In the illustration, the head-capacity curve of the two pumps operating in parallel intersects the system-head curve at 465 gpm and a total head of 410 ft, with each pump delivering one-half of 465 gpm or 232.5 gpm. This seems to be quite probable, since a pump designed for 250 gpm at 400 ft can be expected to deliver 232.5 gpm at 410 ft.

If the total head is 410 ft and the suction head is 10 ft, the discharge pressure will be (410 + 10) / 2.31 or 181.5 psi if we neglect the difference between the velocity heads at the suction and discharge nozzles.

Actually, we should have also assumed a slight increase in suction piping friction losses, hence a reduction in the suction head and therefore in the discharge pressure. It would therefore appear that the slight discrepancy between the observed and calculated discharge pressures at 465 gpm can be easily accounted for without assuming that the pumps are appreciably worn.

In other words, the two pumps operating in parallel cannot be expected to deliver more than 465 gpm through this system unless the friction losses in the piping are reduced.

The friction losses observed appear to be on the high side for this type of installation and it might be advisable to analyze this system to reduce these losses. If this is done, two choices are available to the operator: the pumps may be left as they are and a greater capacity will be available or the impellers can be cut down slightly so that the present capacities are handled by

(Continued on page 244)

Fluid Power Maintenance

VI. Accumulators and Intensifiers

Article covers uses of hydraulic accumulators, some types that are available and operation of several kinds . . . It includes troubleshooting hints and remarks on servicing . . . Material on hydraulic intensifiers includes advantages which can be gained from use of this type equipment

By H. L. STEWART and J. M. MORITZ, Logansport Machine Co., Inc.

ACCUMULATORS AND INTENSIFIERS are important items to consider in a study of hydraulic system maintenance. While not used in the majority of hydraulic systems, this equipment plays a very important part in some applications. In fact, these may well be the items needed if certain circuits are to perform satisfactorily. They can give that needed "shot in the arm" that circuits often require.

There are numerous uses for accumulators and new ones are being discovered constantly. An accumulator is in essence a fluid pressure storage chamber. This fluid under pressure is readily available to perform certain functions in the hydraulic system. The accumulator can be: an emergency source of power, a leakage compensator, a shock alleviator, and an auxiliary source of fluid power. It may also be termed "a pump saver."

Intensifiers are components which increase the operating pressure in a certain phase or portion of a circuit without requiring a step-up in pump pressure which is an ideal condition on high pressure testing circuits. Pressure intensification of 20 to 1 is not uncommon.

Since accumulators find more use in hydraulic systems than intensifiers let us dwell on this component first. There are several kinds of accumulators available, among these are the dead-weight, the hydro-pneumatic, and the spring loaded types. The principles of the dead-weight accumulator and the piston or plunger type of hydro-pneumatic accumulator are ideal as far as the end results are concerned, but these types of units are extremely bulky. A dead-weight accumulator is used mostly with a central hydraulic system in which the pumping unit and accumulator furnish hydraulic fluid under pressure to a complete plant or to one whole section of a plant. Some dead-weight accumulators have a capacity of 500 gal.

The dead weight which forces the piston to descend and in turn feed oil to the system may be pig iron, scrap steel, concrete or any other material which will give the required weight in as small a space as possible. For example, if a 50-gal accumulator is required to do a job and the operating pressure is to be 2000 psi (neglecting friction) there are two ways to approach the job.

Fig. 1. Hydraulic accumulator piston transmits force to fluid

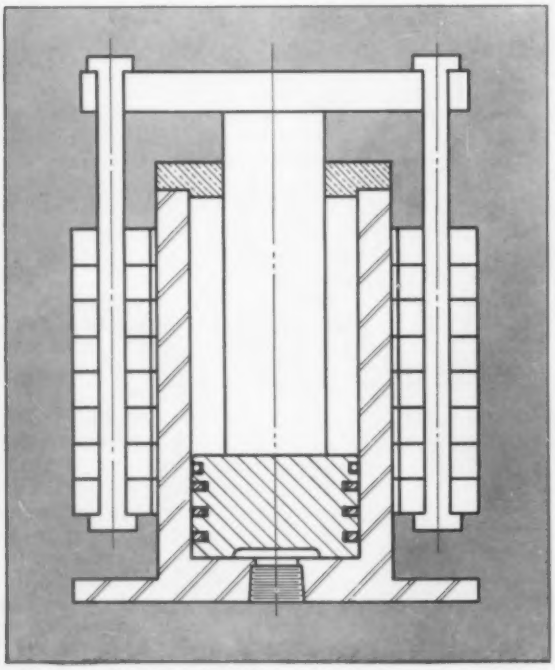
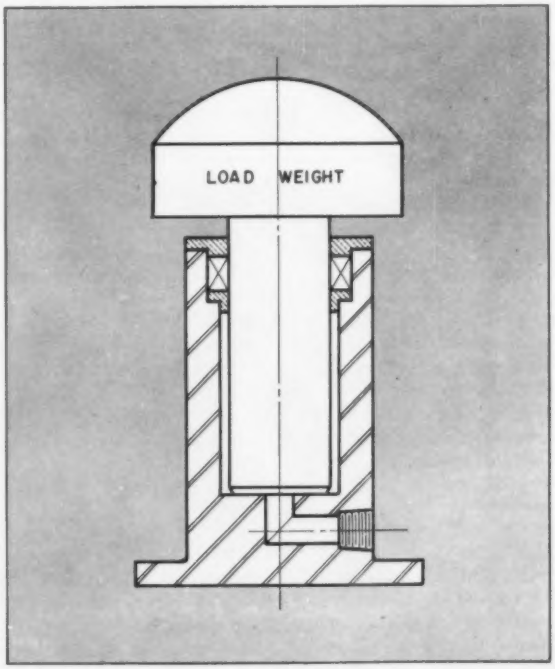


Fig. 2. The fluid is displaced by the rod in this type of unit



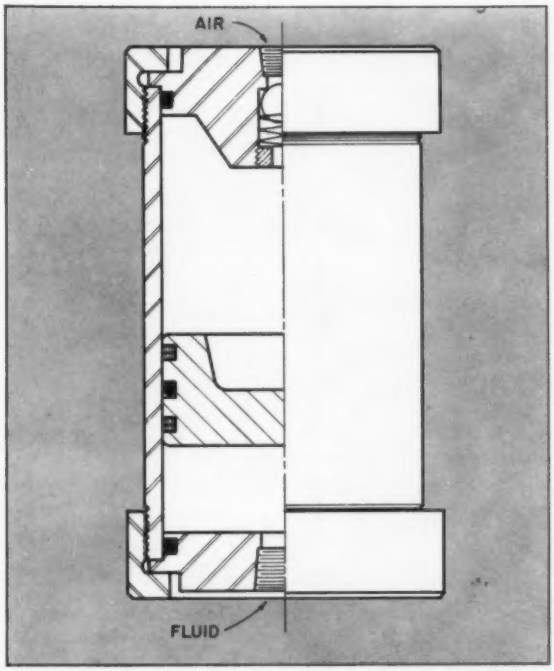


Fig. 3. Cross section of hydro-pneumatic type accumulator

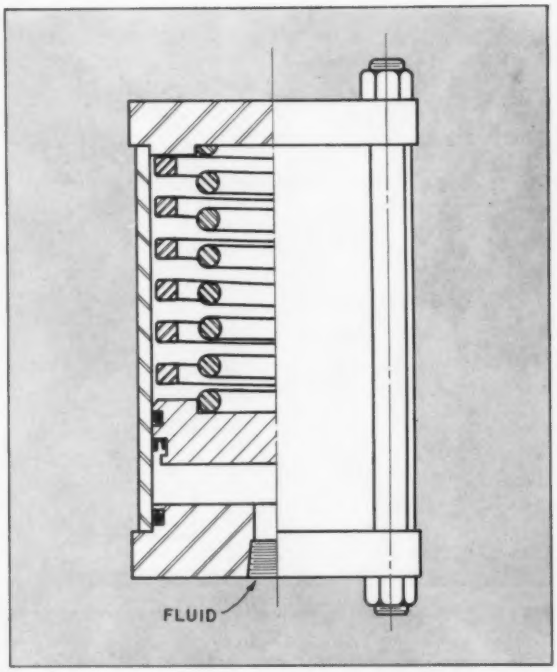


Fig. 4. Energy is stored in a spring compressed hydraulically

A large bore accumulator with a short stroke can be used, or a long stroke accumulator with a small bore. The volume and pressure may be produced by a 12-in. bore chamber with a 102-in. length or by a 6-in. bore chamber with a 408-in. length. In the former the dead weight must be at least 226,200 lb while the weight in the latter must be 56,550 lb. The cross section drawing in Fig. 1 shows the dead-weight accumulator with a piston acting against the fluid while Fig. 2 shows a displacement type in which the rod displaces the fluid. By employing the latter type the I.D. of the accumulator chamber requires no finishing except at the gland since the rod does not come in contact with the interior walls. The rod of this type of accumulator must have an exceptionally good finish since it is working in conjunction with the rod seals and any imperfections on the rod will have a definite bearing on the life of the rod packing.

If the accumulator is located in an extremely dirty atmosphere it may be advisable to use scrapers or wipers in the packing gland to clean off the rod before it moves into the packing. If condensation should rust or corrode the rod then it may be necessary to chrome plate the rod or to replace it with a stainless steel rod. In the case of chrome plating the rod must have a good finish before the chrome is applied.

By using the dead-weight type accumulator one is always assured of the full operating pressure (neglecting friction) for the full stroke of the accumulator. There is no drop in pressure as in some types of accumulators. This feature is a distinct advantage in most hydraulic circuits. The maximum operating pressure of the accumulator can easily be changed by merely adding or reducing weight on the accumulator weight carrier. The maximum weight on the weight carrier cannot exceed the maximum operating pressure of the pump multiplied by the area of ram or piston of the accumulator. If this were exceeded the pump could not raise the load in order to recharge the accumulator.

Side Thrust Elimination

In loading the dead-weight accumulator, the loads should be concentric in order to eliminate side thrust on the plunger which would not only cause excessive wear on the glands and packing but would cut down the efficiency due to increased friction.

The hydro-pneumatic accumulator of the piston or plunger type operates on the principle of a large pneumatic cylinder forcing its power against a much smaller hydraulic cylinder. For example, a 30-in. diameter air cylinder operating at 150 psi and working against a 5-in. diameter hydraulic plunger will exert a pressure on the hydraulic fluid of approximately 5000 psi.

There are a number of advantages in this type of accumulator. It is less bulky than the dead-weight type and thus easier to transport and to install. Pressure changes on the hydraulic fluid can be made by merely changing the operating pressure on the air cylinder. This effects smooth action in operation, practically eliminating need for any shock alleviators. The hydro-pneumatic type does not have a tendency to hammer as does the dead-weight type when the oil withdrawals are suddenly stopped. This may happen when the spool or a blocked center valve is moved into the neutral position. The air provides a cushioning or snubber effect.

Figure 5 shows how a hydro-pneumatic accumulator is used in a central power system in which the high pressure hydraulic fluid is fed to various machines. Note the use of a line to air receiver to provide a sufficient volume of air to the large air cylinder of the accumulator.

Figure 3 shows a typical cross section of a piston type hydro-pneumatic accumulator. Note the important part that seals play in the efficient operation of this type of accumulator. It is imperative that the maintenance personnel keep a close check on the seals and keep leakage to a minimum. For best results the air entering the pneumatic cylinder of the accumulator should be clean and properly lubricated which will help reduce friction on the cylinder walls and increase the life of the seals.

Hydro-pneumatic type accumulators

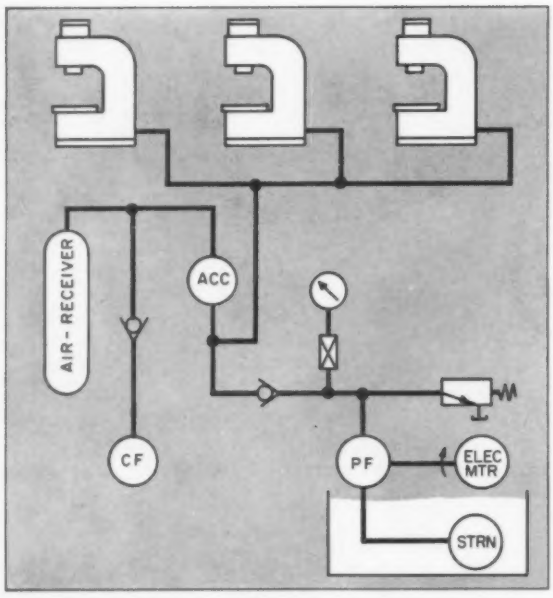


Fig. 5. Hydro-pneumatic accumulator serving several units

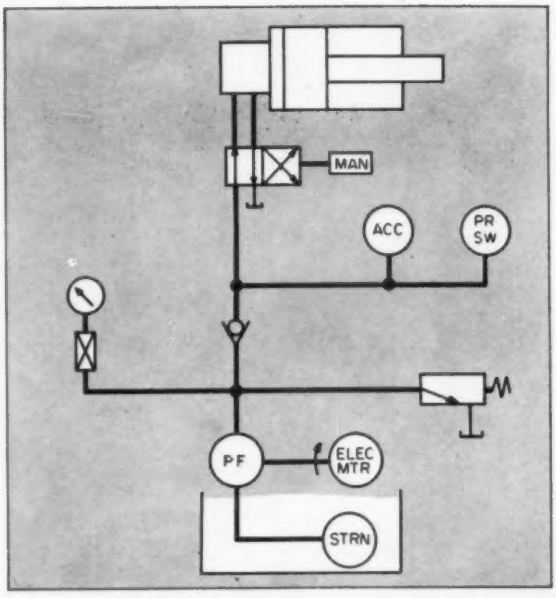


Fig. 6. Accumulator in chucking circuit can be helpful

are also built in other designs and operate upon a different theory than the type previously mentioned. There are accumulators that are precharged with air or nitrogen to a predetermined pressure and operate upon the principle based upon Boyle's law for gases ($P_1V_1 = P_2V_2$). These accumulators may be of the bag, diaphragm, or the piston type. Accumulators of this type are usually installed on a single circuit and not on a central system.

Figure 6 shows how a small accumulator is placed in a power chucking circuit to compensate for leakage during the chucking cycle. With the use of the accumulator the motor runs only a very small portion of the total operating time. This not only reduces the power consumption but also reduces heat, and saves the pump and electric motor.

Small hydro-pneumatic accumulators in addition to requiring little installation space have a number of advantages and are widely used in industry. They are: easy to transport; low in cost as compared to the large type accumulators; inexpensive to operate; easily maintained. Besides, in the diaphragm and bag type there is a permanent wall between the air and oil.

The disadvantages of this type of accumulator is that there is a difference in oil operating pressure from the full position to the empty position as indicated by the Boyle's law formula.

In the spring-loaded accumulator a large spring or number of springs act against a hydraulic piston to force the stored hydraulic oil into the system when needed. Here the oil pressure goes from a high when the springs are depressed to a low when they are extended. Figure 4 shows a typical cross section of a spring-loaded accumulator.

Servicing of accumulators using rams or pistons follows pretty much the methods used in servicing hydraulic and pneumatic cylinders. Always clean the finished surfaces thoroughly polishing out any imperfections in the operating surfaces. Use a good solvent to remove any deposits but make sure that these solvents are completely removed before putting the accumulator back into operation. If it is necessary to rebore and hone any of the bores make certain that the proper diameter packing is used.

Servicing of Bag Type Unit

The bag type of accumulator is serviced easily by removing the oil plug and loosening the air valve stem and then the entire bladder assembly can be removed easily. Check the interior of the shell for any scratches or foreign substances. Clean interior of the shell thoroughly before reassembling. Always consult the manufacturer's operating manual before disassembling any of these units.

Before removing any accumulator from the system or before disassembly is commenced, make certain that all pressure is relieved. Remember, you are working with high pressures and injury to personnel can result if proper precaution is not taken.

If an accumulator seems to fail to operate satisfactorily in a circuit, the maintenance man should check his circuit thoroughly as the trouble may or may not be in the accumulator. Here are some factors to consider:

1. Loss of charge in accumulator when pump is stopped even though no work is being done in circuit. This can be caused by a leaky check valve between the pump and accumulator. The trouble can usually be detected by checking the pump and noticing if the pump shaft runs in reverse when the electric motor is stopped.

Internal leakage in any control valve connected to the accumulator line will also cause the accumulator to discharge. Leakage by the piston seals or ram seals in the dead-weight or large hydro-pneumatic types will cause a discharge.

2. Inability to effect a charge in the accumulator. In the bag or diaphragm type this is probably due to a broken diaphragm or a broken bag. It could be caused also by too high a precharge pressure which stops the oil from entering the accumulator.

In the dead-weight type this trouble is likely caused by a worn pump or one which is not designed with sufficient capacity to overcome the weight. It could be caused also by eccentric loading of the weight which puts so much friction on the plunger that the force from the pump cannot overcome the friction.

In the spring-loaded type broken springs will stop the accumulator from effecting a charge.

3. Excessive noise in a dead-weight accumulator. This is probably caused by the sudden stoppage of a large vol-

ume of oil which causes a hammering sound.

4. External leakage may have several causes depending on the type accumulator involved. On a dead-weight or large hydro-pneumatic type a scored or defective packing or a scored rod may produce external leakage. On a bladder or diaphragm type a split shell or defective gasket may be the cause of an external leak.

When installing accumulators make certain to bleed all of the air in the hydraulic portion. Trapped air can cause considerable trouble in feeding mechanisms.

In applications where the system is called upon to deliver oil constantly accumulators are of little or no value. There must be a considerable number of dwell periods to merit this device.

Shock Reduction

On hydraulic systems where there is considerable shock created by the sudden closing of a valve, an accumulator (preferably the bag type) installed in the line will act as a surge chamber or a shock absorber and will reduce "water hammer" to a minimum. The highly compressible gas in the accumulator will act as a cushion as the oil rushes into the oil chamber.

While any type accumulator can be used as a shock alleviator, the compactness of the bag type makes it ideal for such an application. The use of these shock alleviators will reduce noise, broken piping and broken pipe supports.

Hydraulic intensifiers while used to great advantage on high pressure testing circuits also have other applications such as punching, shearing, riveting, and clamping. The motivating medium to operate the intensifier may be air or oil but for compactness in most industrial applications oil pressure is preferred.

The principle of the intensifier is very simple. It is simply a piston of a large area driving a piston of a small area. See Fig. 7. The intensifier may be single or double-acting, i.e. the large piston may be returned by spring pressure on the single-acting and on the double-acting the motivating hydraulic power returns the piston. Intensifiers of the double-acting type can also be constructed with two intensifier rams so that intensification can be effected in both directions of the piston movement. In most instances this is not required.

There are a number of advantages derived from the use of intensifiers:

1. Elimination of high pressure pumps. When pressures with intensities of 15,000 or 20,000 psi are needed, it is practically impossible to obtain such a pump. By using a 20 to 1 intensifier, a pump operating at 1000 psi is all that is needed.

2. Elimination of long lengths of extremely high pressure piping and reduction in number of high pressure valves. The intensifier can be mounted adjacent to the work or work cylinders.

3. Availability of wide assortment of operating pressures. By merely changing the setting of the relief valve of the power unit, the operating pressure of the intensifier can be varied to meet operational requirements.

4. Absence of heat on extremely high pressure applications. If a pump were required to produce fluid at extremely high pressures, the oil flowing through the relief valve would create quite a heat problem. However, with the intensifier pressures can be held for long periods without creating heat.

5. Saving in space requirements of operating cylinders. By using intensified pressures, much smaller operating cylinders can be installed. This is a distinct advantage in riveting or punching applications or where the operating cylinder must be portable.

In order to obtain proper results from an intensifier, the productive work must be completed before the intensifier ram reaches the end of its stroke, otherwise there will be a sudden drop in pressure.

Intensifier Packing

On high pressure intensifiers packings may become somewhat of a problem. It is very difficult to hold extreme pressures. The finish on the intensifier ram must be of a high quality in order to eliminate scoring of the packing. If possible the finish should be held to within five micro-inches.

Since servicing of the intensifier is very similar to that of a hydraulic cylinder, we will not dwell on this phase. However, we should like to include a few words of caution—do not dismantle an intensifier until all pressure is released.

Remember if you set up a preventive program for your hydraulic systems and use the systems to the extent and purpose for which they were designed, they will pay you big dividends and should give you long, trouble-free service.

Fig. 7. Hydraulic pressure intensifier

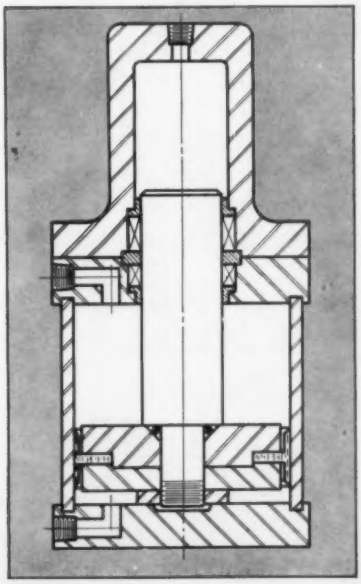
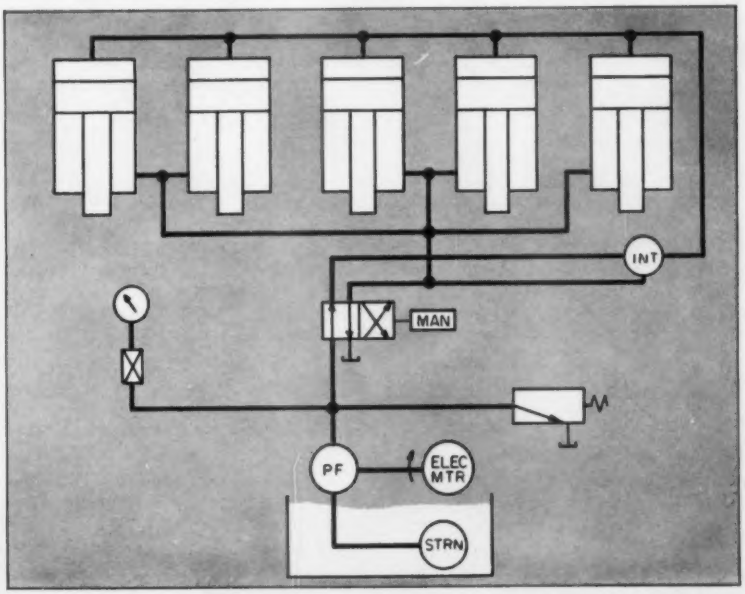


Fig. 8. Sample application of intensifier for operation of punching cylinders



Do you know all you would like to know about positive displacement meters? . . . Where such a meter would do a good job for you; what type to select; how to install it; and how to take care of it? . . . You will find some of the answers here.

Positive Displacement Meters—

Selection, Care and Troubleshooting

By **PAUL A. MANKIN**, Chief Engineer, Rockwell Manufacturing Co., Pittsburgh, Pa.

USES OF positive displacement meters are growing, ranging from metering oils at 350 F to liquid oxygen at –360 F. In petroleum, chemical, brewery and general industrial applications, the meters are installed on tank trucks and cars, as well as on plant process and service lines for the measurement of gasolines, oils (petroleum and vegetable), liquid petroleum gas, alcohols, syrups, water, acids, vinylchlorides, butadienes, etc.

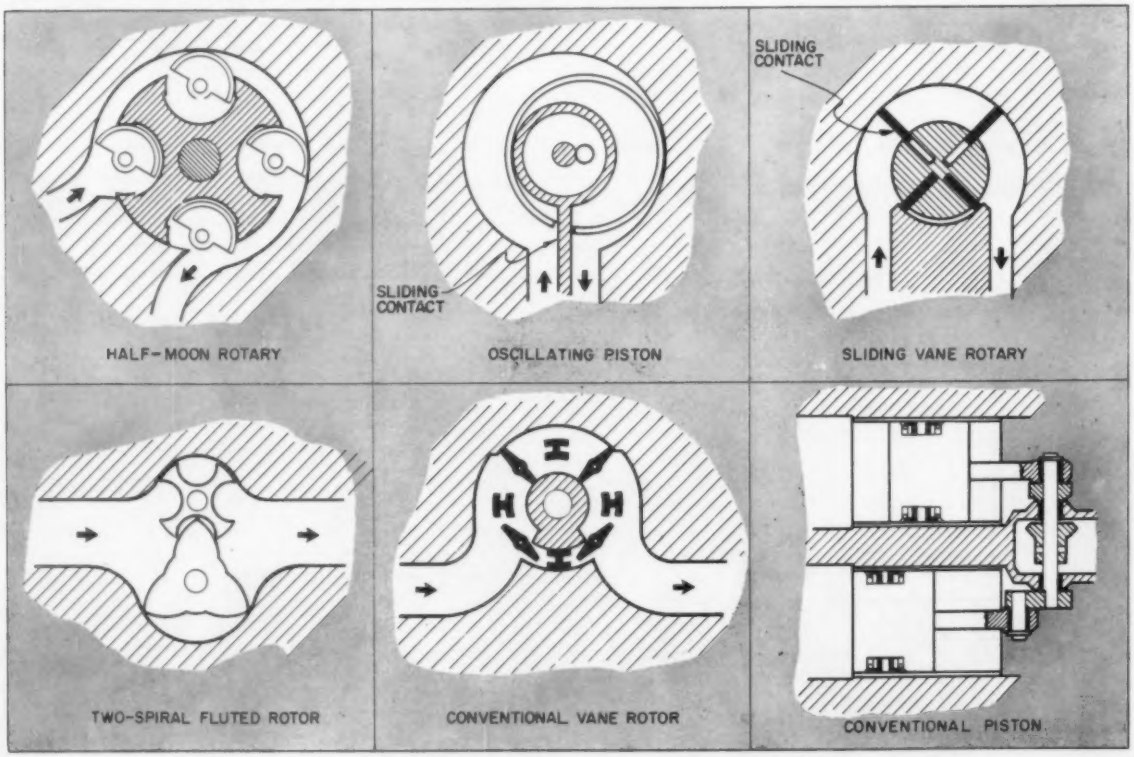
A positive displacement meter may be considered as divided into two sections: a sealed-off section between inlet and outlet connections to isolate temporarily the incoming liquid stream and a measuring chamber or chambers which are sealed either mechanically or by a liquid.

The meter operates on fluid pressure and it measures by the liquid filling the measuring chamber then emptying, filling, emptying, and so on. The capacity of the measuring chamber remains constant; if some device records the number of times the known volume of the measuring chamber is filled, the total flow through the meter may be obtained by simple multiplication. Although over-simplified, this is essentially how this meter operates.

In the measuring chamber, the incoming stream is divided into a number of equal volumes, the number varying with the type of meter. The liquid pressure from each volume pushes a piston or vane, and then is discharged from the meter. Each push is transmitted through gearing to a counter. The counter totals the number of pushes continuously, and translates the sum into gallons or other volumetric units.

Six principal types of meters avail-

Fig. 1. Six principal types of positive displacement meters. Choice depends on characteristics of the application



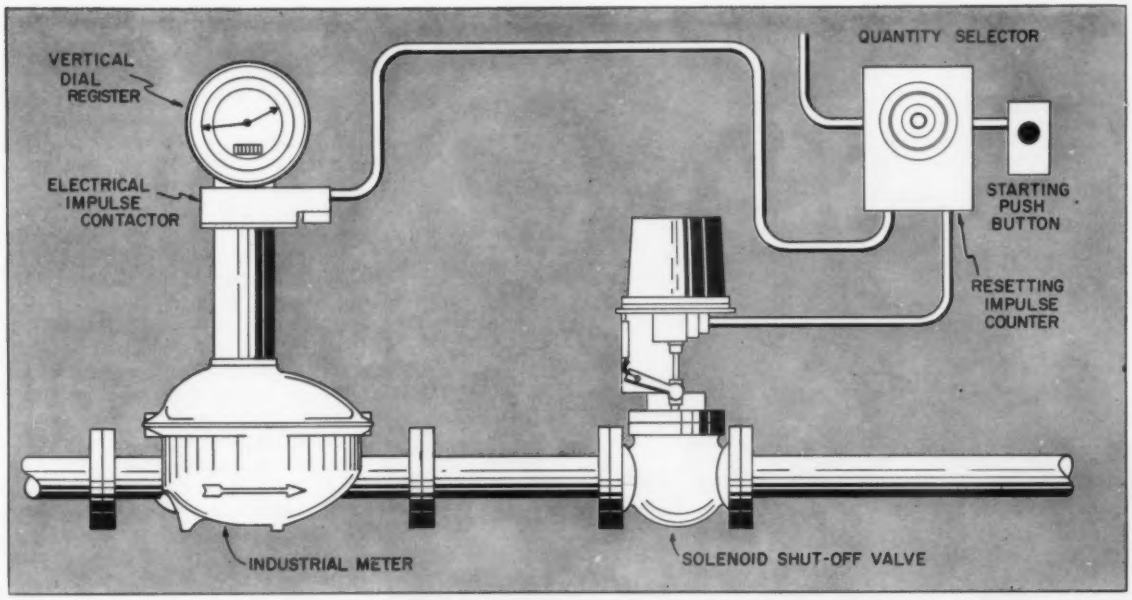


Fig. 2. Metering system usually includes accessories such as register that rings bell, lights lamp, starts or stops pump

able—half-moon rotary, oscillating piston, sliding vane rotary, two-spiral fluted rotor, conventional vane rotary, and conventional piston—operate in this fashion.

Meter Selection

Selection of the correct positive displacement meter for a specific application depends on certain characteristics of that application. The plant engineer should possess the following data before selecting a meter: the liquid to be metered; pressure at meter; viscosity or specific gravity; temperature of the liquid; whether the liquid is lubricating or non-lubricating, corrosive or non-corrosive; whether the liquid is free of foreign material or solids and if not, determine percentage and particle size if possible; degree of meter accuracy desired; maximum and minimum rate of flow; and pipe size.

The rate of liquid flowing through the meter dictates size. For example, the half-moon vane meter, Fig. 1, is designed in various sizes to accommodate rates from 20 gpm to 1000 gpm and pressures from 125 psi to 1500 psi. The "repeatability," or the ability of a meter to repeat on preset volumes is good-value in processing and marketing applications. The half-moon vane meter repeats to the fourth decimal place.

Materials of construction for the meters depend on corrosive properties of the liquid to be metered. Meters constructed of all stainless and all bronze, as well as all ferrous, are in common use.

Strainers, air eliminators, and back-pressure and rate-limit valves are considered part of the metering installation, in addition to the meter proper. Sometimes, special accessories are used to automate the installation: for example, a register that rings a bell, buzzes a buzzer, lights a lamp, starts or stops pumps, indicates total flow remotely, or prints the flow to provide permanent records when certain quantities of liquid have been metered. (See Fig. 2).

A strainer is a simple but extremely important part of the metering system and considerable meter damage can result through fouling with dirt or other foreign material. It should be installed as near as possible to the inlet side of the meter. If it is impractical to install the strainer on the meter inlet, the piping between strainer and meter should be thoroughly cleaned before installing the meter in the system. This will prevent pipe scale, welding beads, etc., which could cause malfunctioning, from entering the meter.

On rotary type positive displacement meters it is practical to remove the metering mechanism, which is usually called the rotor assembly, from the meter body or housing; by replacing the cover, the body will serve as a "spool piece" or "dutchman" for flushing and cleaning new systems. A spool of auxiliary pipe should be used for this purpose before installing a piston type meter, since the internal mechanism is not easily removed.

The strainer basket should be cleaned frequently since a loaded strainer will reduce the rate of flow through the meter, Fig. 4. The frequency of cleaning depends upon the amount and size of dirt or foreign particles being transferred in the system. On new systems it may be necessary to clean the strainer more frequently because welding scale and beads as well as dirt may be present.

An air eliminator is essential in a variety of metering systems for the separation of air or vapor from the liquid. The passage of air or vapor through a meter will give false registration. The air eliminator should also be installed as close to the meter as possible, with the strainer separating the meter and air eliminator. The air vent line from the top of the air eliminator may be piped to the atmosphere; if liquid drippings are experienced from the air vent, the vent should be piped to an auxiliary tank or storage tank which is vented to atmosphere to collect the drippings.

Purging the System

After installing the metering equipment, all air should be purged from the system. The liquid and air should be allowed to proceed very slowly through the metering equipment until all air has been removed. This will prevent over-speeding and shock to the meter. The air will over-speed the meter and shock will occur when a slug of incompressible liquid, travelling at a high velocity, enters the meter.

The meter should not be operated beyond its rated capacity on any system unless approved by the manufacturer. Nameplate on the meter shows rated capacity and pressure rating.

On some installations it may be

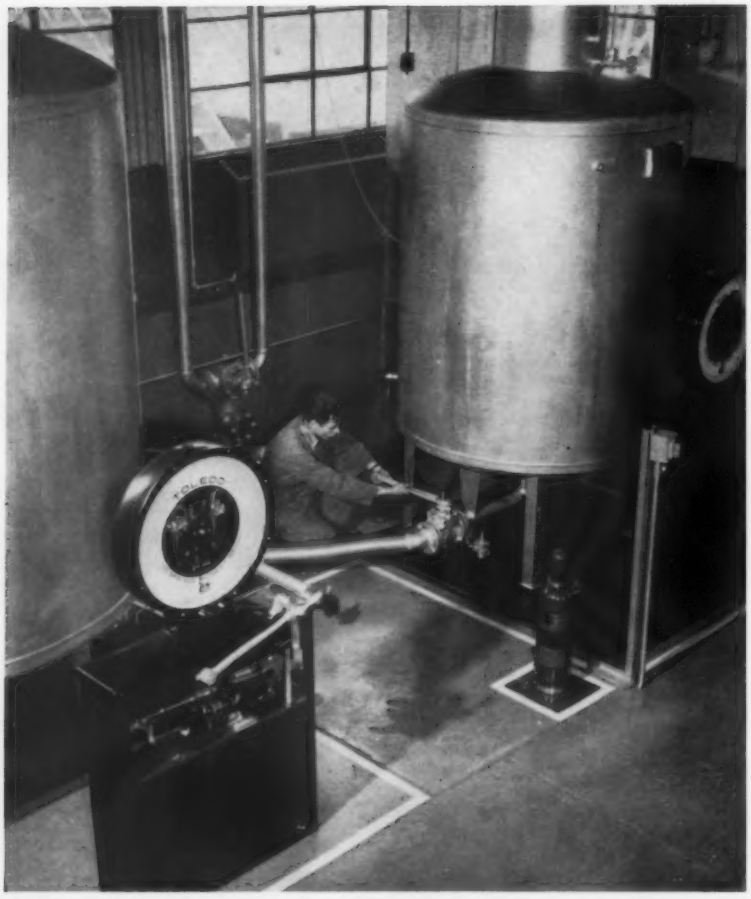


Fig. 3. Test station meter proving system. Prover tank must be level and viscosity of the test liquid must be close, or equal, to that of the metered liquid

necessary to retard flow so as not to exceed the maximum rated capacity of the meter. Should this be necessary, the device for regulating the flow, usually a rate limit valve controlled by the line pressure, must be installed on the discharge side of the meter.

Avoid throttling on the inlet side of the meter, because the volatility of the liquid may be such that it will vaporize easily at restrictions in the piping and if throttled at this point false registration could be experienced. On highly volatile liquids, properly size the system and avoid restrictions that could cause vaporization.

Trouble Shooting

A positive displacement meter may be used in the manufacture or blending of an expensive liquid product as well as the inventory control and/or sale of an expensive finished product. On many applications, meters are used to automate the system. On new systems this results in a reduction of manpower, as well as holding capital investment to a minimum. Where meters are added to existing systems, a considerable reduction in operational expense results.

Because of the important role that a meter plays in many systems, it is advisable to have a workable and active preventive maintenance program. The loss of the services of a meter may prove very expensive.

If a metering system fails to perform as designed, the natural tendency is to complain about the meter, and the common statement is usually "the meter is not measuring accurately." In the majority of cases the malperformance of the meter is the result of misapplication, dirty system, improper sizing of auxiliary equipment, etc.

This is not to imply that meters will not fail or wear out. They will. But it is a good policy to assume the meter is giving good service and check other auxiliary equipment before checking the meter.

Possible meter difficulties include: under-registration, over-registration, reduced rate of flow, complete stoppage of both meter and liquid flow, stoppage of meter register but liquid still flowing.

Under-registration (the volume put through is greater than the amount recorded on the registering device) is the result of leakage around the sealing members of the measuring mechanism or of a faulty register. The leakage in most cases is caused by worn moving parts on meters with a service record. On new meters it could be caused by an extremely dry product or dirt build-up on moving parts which imposes a drag on the mechanism.

Over-registration (the volume put through is less than the amount recorded on the registering device) is not a frequent complaint but does happen on some installations.

As previously mentioned, the air and vapors must be separated from the product to assure accurate registration. If air and vapor are present, over-registration will result. This could be caused by a faulty air eliminator, plugged air eliminator vent line, restrictions in the system causing vaporization of the product and a leak on the suction side of the pump, or by an erratic register or meter accuracy adjustment mechanism.

If the rate of flow through the meter is reduced, check the system for restrictions: open air eliminator vent, worn pump, badly worn meter or mechanical interference in the meter. The restriction could be a plugged strainer or pipe, partially closed valve, etc.

If complete stoppage of the meter and liquid is experienced, it is usually caused by a mechanical failure in the meter or pump. If the meter does not stop instantly but slowly, look for a faulty valve or a spot in the system for complete build-up of sediment. On high vapor pressure liquids there is a chance for vapor lock in the system. It is always a good policy to check supply volume.

Plant engineers may at some time experience liquid flowing through the meter but the register is not recording. If this happens, look for a broken shaft, gear or pin in gear trains of the meter and register.

It is important to periodically check the accuracy of all types of meters to determine if the meters are performing in accordance with their designed accuracy. On service lines carrying fuel oil to burners or water to boilers, for example, meter testing is important from the standpoints of economy and efficiency. Incomplete combustion may be occurring in one particular burner; the only indication might be excessive fuel consumption as indicated by a positive displacement meter.

Testing meters is also important on

lines carrying process liquids. Where liquids are involved in product manufacture, a small error in measuring liquid entering a reaction vessel could result in a large dollar loss from a bad product.

The two most commonly used systems for checking meter accuracy are the so-called permanent and portable systems. Both systems are currently in use for checking marketing and industrial meters. The permanent system is most common in industry and the portable system is most common in marketing. The permanent system is the more expensive of the two for checking marketing meters but the reverse is true for industrial meters. The portable system for marketing meters simulates very closely the conditions under which the product is normally delivered, while the permanent system in most cases more closely simulates industrial meter applications. (See Fig. 3)

The prover tanks, whether permanent or portable, should be procured from tank manufacturers with the necessary experience. If manufactured by the user, they must be manufactured in accordance with proven designs. These tanks should be checked periodically for accuracy.

Prover System Pointers

The size of the prover depends upon the meter size. The capacity should be equal to the maximum rate of flow of the meter for a duration of one minute. For example, if the maximum rate of the meter is 500 gpm, the prover tank should have a minimum capacity of 500 gal. It is the best policy to avoid improvised prover tanks or systems as it may prove costly in the long run.

Bottom filling prover tanks of large capacity give most efficient service, permitting faster filling, eliminating practically all foaming and keeping loss at a minimum.

Important points to note in a prover system are:

The prover tank must be level.

Meter should be tested in its normal operating position wherever possible.

The viscosity of the test liquid should be very close, if not equal to the metered product. A difference in viscosity will affect meter accuracy.

The meter should be as close to the prover tank as possible.

The throttling valve should always be on the downstream side of the meter to guard against vaporizing liquid.

A quick opening and closing valve should be used in discharge line to start meter as fast as possible and to stop meter on the desired quantity.

A quick opening and closing valve should also be used on prover tank discharge line to control the draining time and to reduce time of test cycle.

The prover tank should be 100 per cent wetted before checking meter accuracy and on wetting the tank the meter register should be ignored. There is always a certain amount of clingage of the liquid to the prover tank and the clingage will not change on subsequent tests.

The drainage time of the prover tank shall be the same on all tests. This will assure uniform results.

Important steps of a test are as follows:

1. Start with a wetted tank.
2. Reset register to zero.
3. Test meter at its maximum and minimum rates of flow.
4. Operate the meter to the quantity on the register equal to the prover tank capacity.
5. Record the average over or under delivery in percentage or cubic inches. This is taken from the calibrated plate on the prover tank.
6. Repeat tests as much as four times to eliminate the human error.
7. The percentage of error should be the same at maximum and minimum rates of flow, the reason being that the performance curve retains its shape on all meters. If these results are attained, then the meter can be adjusted to 100 per cent.

If the error is different at maximum and minimum rates of flow as recommended by the manufacturer, this means that there is a mechanical fault in the device. Check for dirt, worn parts, etc.

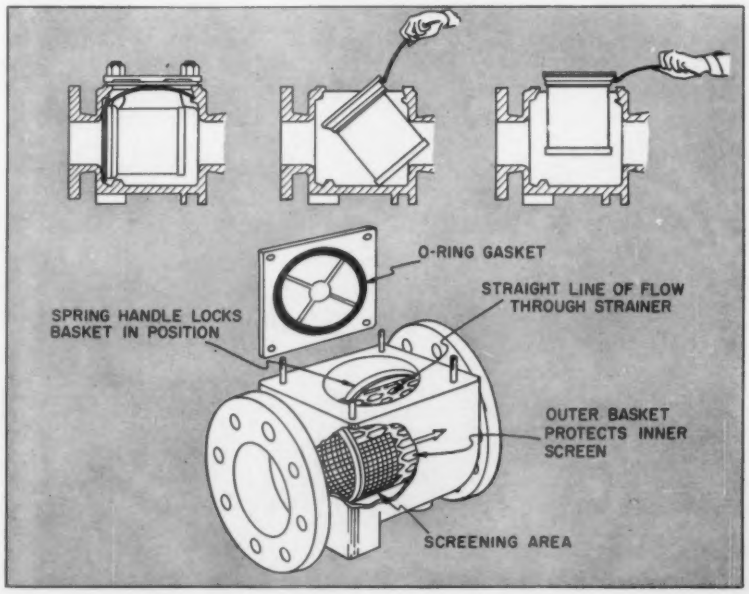
8. If the temperature of the liquid

changes between the time it passes through the meter and the time the tank is read, it is advisable to make temperature correction to tank recordings.

9. It is a good policy to check pressure drop across meter to determine if the meter is functioning properly and that there is no mechanical trouble.

On all rotary and some piston positive displacement meters a mechanical adjustment is used to make the counter reading correspond to the total liquid flow through the meter. On other types of piston meters the total volume through the meter is adjusted to correspond to the counter reading. This is accomplished by a mechanical adjustment that adjusts the stroke of the pistons, lengthening the stroke for more volume and shortening for less volume.

Fig. 4. Strainers must be located near inlet side of meter and cleaned frequently


O-RING GASKET
STRAIGHT LINE OF FLOW THROUGH STRAINER
SPRING HANDLE LOCKS BASKET IN POSITION
OUTER BASKET PROTECTS INNER SCREEN
SCREENING AREA

Matching Steam Supply to Demand

Fuel Switch Gives Steady Supply, Solves Smoke Trouble

By **HERBERT GOLDSTEIN**, Plant Engineer, L. Sonneborn Sons, Inc., Belleville, N. J.

BY THE END of 1953, efficient, economical production of steam for both plant services and for processing operations in our plant, which spreads over 17 acres of land, presented a serious problem. With steam demand constantly fluctuating from low to peak without advance warning to the boiler room or following any pre-determined schedule, both our plant boilers often failed to match steam delivery to plant requirements. At that time, both boilers were coal-fired and had antiquated controls and inadequate instrumentation.

Batch processing of greases, fluid lubricants, textile finishing oils, cutting oil bases, industrial cleaners, etc., is carried on at the Belleville plant. Consequently, steam demand is always varying, depending upon the petroleum specialty batches being produced on any particular day and at any particular time. Batch size ranges from 1000 to 50,000 gallons. Most of the processing tanks are heated either by steam jackets or by internal steam coils.

Several tank cars of oil of varying consistencies are received every day, and these cars usually require steam for heating to make the oil flow properly. Additional steam is required for the operation of a Corliss engine (built in 1912) which operates a 125 kva 220 v three phase a-c generator to supply approximately 30 to 40 per cent of the plant requirements for electrical power. The net result of these requirements for steam is that the hourly demand on the boiler plant varies from a minimum of 4000 lb or 5000 lb at 50 lb pressure to a maximum of 18,000 lb at 90 lb pressure many times throughout each day.

There are two boilers at the Belleville plant, one for normal, every-day operation, the other a reserve or standby unit. The everyday boiler (installed in 1936) has a nominal rating of 220 hp. This boiler was fired by coal, manually fed to a hopper and then to the combustion chamber by means of an underfeed stoker. The standby, longitudinal drum type boiler, (installed in 1926) has a nominal rating of 200 hp. This, too, was coal fired, but in this case the firing was completely manual.

In normal plant operations, the boiler used every day may function at ratings as high as 225 per cent of the nominal rating for periods as long as four hours without stopping. Boiler pressure is maintained at 90 lb during the day and dropped to 50 lb at night during winter months. In the spring, summer and fall, boiler steam service is curtailed and boilers shut down at night.

When boilers were coal-fired, a 30 per cent volatile coal was used. This provided smoke-free operation when the larger boiler was operating. However, when the standby boiler was used, a very bad smoke condition occurred. This was not considered important many years ago when the immediate vicinity of the plant was sparsely populated, but in recent years, encroachment of residential construction into the adjacent areas made smoke curtailment essential.

An equally serious problem was the inability of the coal-fired boiler to maintain constant pressure when steam requirements changed rapidly. Rapid load fluctuations caused steam pressure to drop to a point which necessitated stopping the Corliss engine just when electrical power was most needed. The boiler did have sufficient capacity to carry the load if it was given enough time to catch up to demand, but the time was seldom available.

Fig. 1. Plant Engineer Herbert Goldstein shows the boiler room control panel

Fuel Changeover

The first step in matching steam supply to demand and eliminating the smoke problem was to convert both boilers to No. 6 fuel oil. In making this change, it was anticipated that costs would be reduced by savings in fuel expense and by elimination of the coal passer necessary to unload coal cans, pass coal, handle ashes, etc.

No special problems were encountered in the conversion of the older standby boiler, but the other boiler had a relatively small combustion chamber for oil firing. Therefore, an air-cooled "dutch oven" or extension furnace was added to the front of the boiler to provide a combustion chamber of sufficient capacity.

The control system was designed to

make operation of the larger boiler completely automatic. Manual controls were provided for the longitudinal drum boiler. Each boiler can be operated independently but an interlock system was installed for simultaneous operation when necessary.

The control problem was complicated by the need for a rapidly modulating control to serve both the low fire (providing a nighttime load of 4000 lb to 5000 lb of steam per hour at a pressure of 50 lb) and the full fire (for daytime operations where the normal load is usually 12,000 lb, frequently rising instantaneously to peaks of 18,000 lb of steam per hour at a pressure of 90 lb).

The combustion control system, supplied by the Cleveland Fuel Equipment Co., is all-electric and highly responsive to demand for steam. Complete control of fuel and air is provided by a panel-mounted master regulator connected to a "Lectricarm" power actuator, bracket-mounted on the dutch oven.

Automatic Air-Fuel Mix

The regulator provides automatic proportioning of fuel and air feed, according to load requirements, for maximum combustion efficiency. It is connected by a steam pressure line to the boiler, and responds to changes as small as 1 per cent in steam pressure. Heart of the regulator is a sensitive, spring-loaded bellows which actuates a snap action contact assembly. Fuel feed is modulated by increments directly proportionate to changes in pressure and load as well as to the rate of these changes. The switching mechanism includes an automatic reset that prevents hunting.

The power actuator has direct linkage to the jackshaft, and moves in response to impulses transmitted from the main regulator bellows through contacts in the pressure switch assembly. It is a sensitive, remotely controlled, automatic unit with a 110 v, 60 cycle motor. The motor drives a straight-line, jack screw type arm forward and reverse in exact ratio to the change in operating impulse provided by the regulator. It provides immediate response to small changes in steam pressure and the switching mechanism reverses instantly when required.

The linkage between the power actuator and the jackshaft simultaneously modulates a characterized fuel valve, the primary air supply, the wind box vanes and the forced draft fan inlet louvres. The correct fuel-air ratio is maintained over a wide turndown range by another control which has an infinitely adjustable cam for matching oil flow to air flow at all firing rates.

The furnace draft regulating system has two main components, an electrically-operated damper control and a power actuator. The damper control incorporates a sequence relay mechanism and a sensitive dry diaphragm switching device into one small, compact, panel-mounted cabinet. Draft connection is provided by a sample line from the combustion chamber. The entire furnace draft regulating system is interlocked electrically with the primary controls to delay ignition until the boiler outlet damper is open, thus providing a purge period. After the flame is established, a constant furnace draft is maintained during burner operation.

The power actuator is bracket-mounted adjacent to the boiler outlet damper with direct linkage to the damper arm. When increased steam pressure is required, the control moves the outlet damper to its maximum open position. Upon a signal from the "open damper" limit switch, the flame safeguard mechanism cycles to prove burner ignition. When the flame has been proved, the sequencing relays then cause the control to modulate the boiler outlet damper so as to maintain a constant rate of draft over the fire. When the burner is cut off by the pressure switch, the outlet damper automatically moves to its closed position so as to retain latent heat in the boiler for as long a period of time as possible.

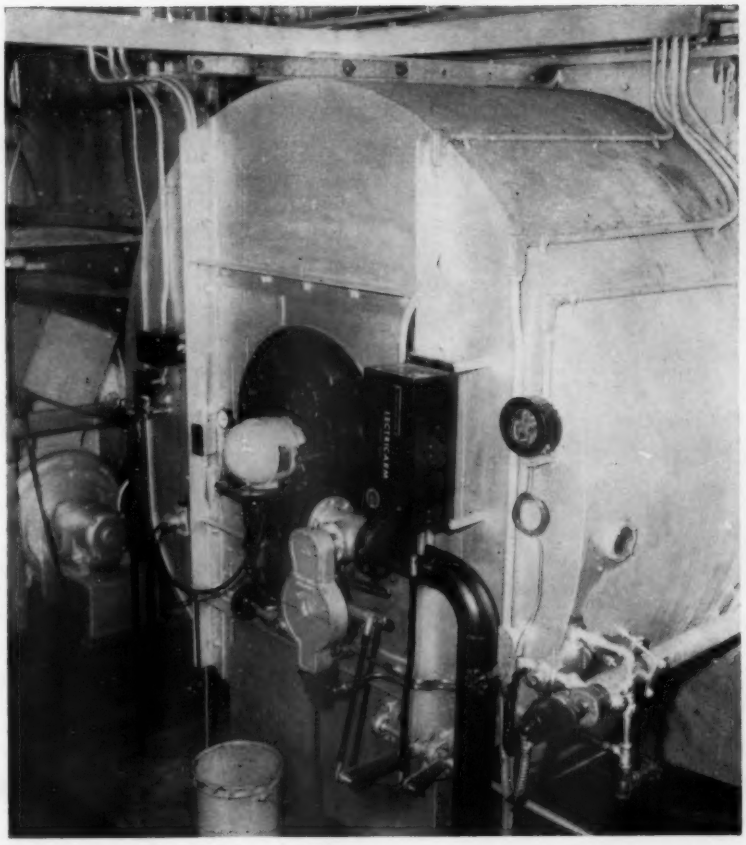


Fig. 2. Dutch oven attached to boiler increased combustion chamber capacity

The control panel, in addition to some components of the combustion control and furnace regulating systems, also carries over-fire and last pass draft gages and flue gas temperature indicating instruments, a steam flow-air flow meter, smoke recording equipment and a steam pressure recorder.

Conversion of these boilers to oil firing with a completely automatic control system has completely eliminated the problems attendant to matching steam production and pressure to plant requirements. Instantaneous response to peak loads is provided, and the immediate reduction in fuel consumption for steam production when maximum demand has passed assures economical use of fuel. The controls keep pressure constant regardless of load conditions. Sensitivity of the damper positioning system assures precise mixing of fuel and air for maximum combustion efficiency. Since installation of the new system, the Corliss engine has never failed to operate from low pressure or lack of steam.

National delegates from the AIPE chapters formulate future policy at the third annual convention held in Cleveland

AIPE Convention—1957

O. W. Graveley Named Fellow—National Officers Elected

DELEGATES FROM 29 of the 32 chapters of the American Institute of Plant Engineers, and three delegates, representing the members-at-large membership, attended the third annual convention of the AIPE.* The convention was held at the Hotel Cleveland, Cleveland, Ohio, on Sunday, January 27th.

At the end of the morning business meeting, the delegates from each region held a caucus to elect a Regional Vice President for the coming year. Their choices were:

Regional Vice Presidents

Northeast Region: P. G. Damm, Merck Sharp & Dohme, Div. of Merck & Co., Inc., West Point, Pennsylvania.

East Central Region: D. L. Smith, The Duriron Co., Inc., 425 N. Findlay St., Dayton, Ohio.

North Central Region: S. A. Simonson, Chicago Hardware Foundry Co., North Chicago, Illinois.

Central Region: C. R. Libby, W. E. Caldwell Co., 200 E. Brandeis St., Louisville, Kentucky.

Southern Region: W. E. Seales, F. H. Maloney Co., P. O. Box 1777, Houston, Texas.

Western Region: T. H. Hardgrove, Aerojet-General Corp., Azusa, Calif.

One of the highlights of this convention was the election of Oscar W. Graveley to the membership grade of Honorary Fellow of the AIPE. He was honored for his contributions to plant engineering during his government service as Director of Mainte-

*Additional information about the AIPE organization can be obtained by writing to National Headquarters, Westminster Building, Room 620, Chicago 3, Illinois, or contacting any of the national officers or regional vice presidents.

John Waligora, speaking at the All Engineers' Luncheon, was elected president of the AIPE for the coming year

Other national officers elected were, l to r: K. N. Banthin, treas.; R. S. Grant, sec'y.; and R. F. McCaw, vice president

nance, Office of the Assistant Secretary of Defense.

The Certificate reads: "This is to certify that Oscar W. Graveley has been elected by the Executive Committee to the membership grade of Honorary Fellow in recognition of meritorious service to the Institute and to Plant Engineering as a profession."

Since his service with the government, Mr. Graveley has returned to the Electro-Metallurgical Co., Div. of Union Carbide and Carbon Corp., Niagara Falls, N. Y., as technical assistant to the works manager.

National Officers

National officers elected were:

President: J. M. Waligora, Merck Sharp & Dohme, Div. of Merck & Co., Inc., 640 N. Broad St., Philadelphia 1, Pa. He is a charter member and past president of the Greater Philadelphia Chapter. He also served as regional vice president in the Northeast Region in 1956.

Vice President: R. F. McCaw, National Broadcasting Co., RCA Building, Radio City, New York 20, N. Y. He is a founder and past president of the Greater Philadelphia Chapter.

Secretary: R. S. Grant, General Products Division, Owens-Corning Fiberglas Corp., National Bank Building, Toledo, Ohio. He was a member of the Greater Kansas City Chapter holding the office of vice president in 1954. He is now a member of the Northwestern Ohio (Toledo) Chapter.

Treasurer: K. N. Banthin, Visking Co., Div. of Union Carbide and Carbon Corp., 6733 W. 65th St., Chicago 38, Illinois. He is a member of the Chicago Chapter and holds the office of secretary-treasurer.

All Engineers' Luncheon

On Tuesday, January 29th, plant engineers from all over the United States and Canada attended the fourth annual luncheon sponsored by the American Institute of Plant Engineers.

Richard H. Morris, first president of the AIPE, and Robert W. Hiller, retiring president, received gifts from the Board of Directors in recognition of their efforts in furthering the ideals of plant engineering and promoting the national organization.

One of the speakers at the luncheon was Colonel Paul Walker, who described the activities of the Installation Engineer in the Air Force.

The principal speaker, Dr. A. J. Cardall, gave a humorous and, at times, serious talk on how the plant engineer can do a better or worse (depending upon his attitude) job of getting along with plant personnel.

Oscar W. Graveley, left, accepts Certificate of Fellowship presented by R. W. Hiller, retiring president. He is the first man to be so honored by the AIPE

T. E. Hanson, editor of Plant Engineering, presents gavel to R. W. Hiller

Gifts were given to Bob Hiller and Dick Morris, past presidents of the AIPE

Principal speaker at the luncheon was Dr. A. J. Cardall who gave an entertaining talk on the attitudes the plant engineer should have in handling plant personnel

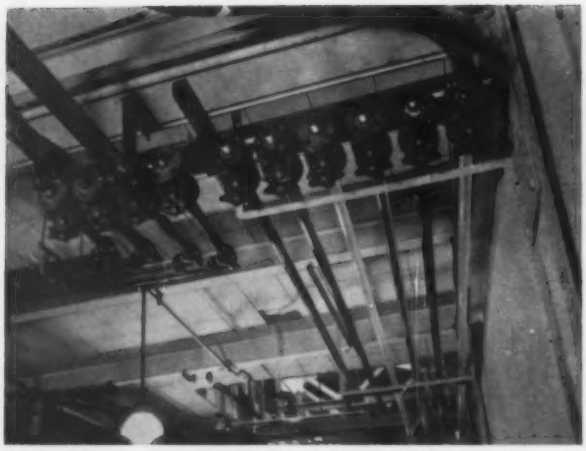


Fig. 1. Purity insurance is reason Philadelphia brewery uses glass piping to convey finished product from vat to bottling area

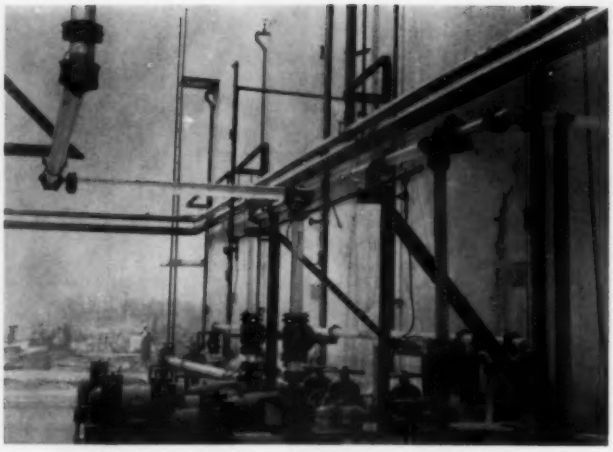


Fig. 2. Glass pipelines are used to handle sodium hypochlorite bleach to and from pumps in this paper mill

Let's Look Into Glass Piping—

How About Its Selection, Application and Maintenance?

By GARRETT S. PARKER, Product Specialist, Technical Products Div., Corning Glass Works

AN INCREASING number of process industries have been turning more and more to a comparative newcomer in the fluid conveying field—glass pipe—to solve their process woes. Here is a material that combines acid resistance with visibility, toughness with lightness, and free-flowing, non-contaminating surfaces with high thermal shock resistance.

Growing pains for glass piping were a bit more rigorous than for other piping materials. Even though it has been in use in processing industries for over 35 years, glass pipe has had a big stumbling block to jump over—"Glass," any engineer could tell you, "breaks!" And that would generally end all interest in this material for industrial piping.

World War II, however, stimulated renewed interest in the possibilities of glass piping, and seven years ago engineers in our company came out with an improved product—a double-tough glass pipe—given 2½ to 3 times its previous strength through tempering.

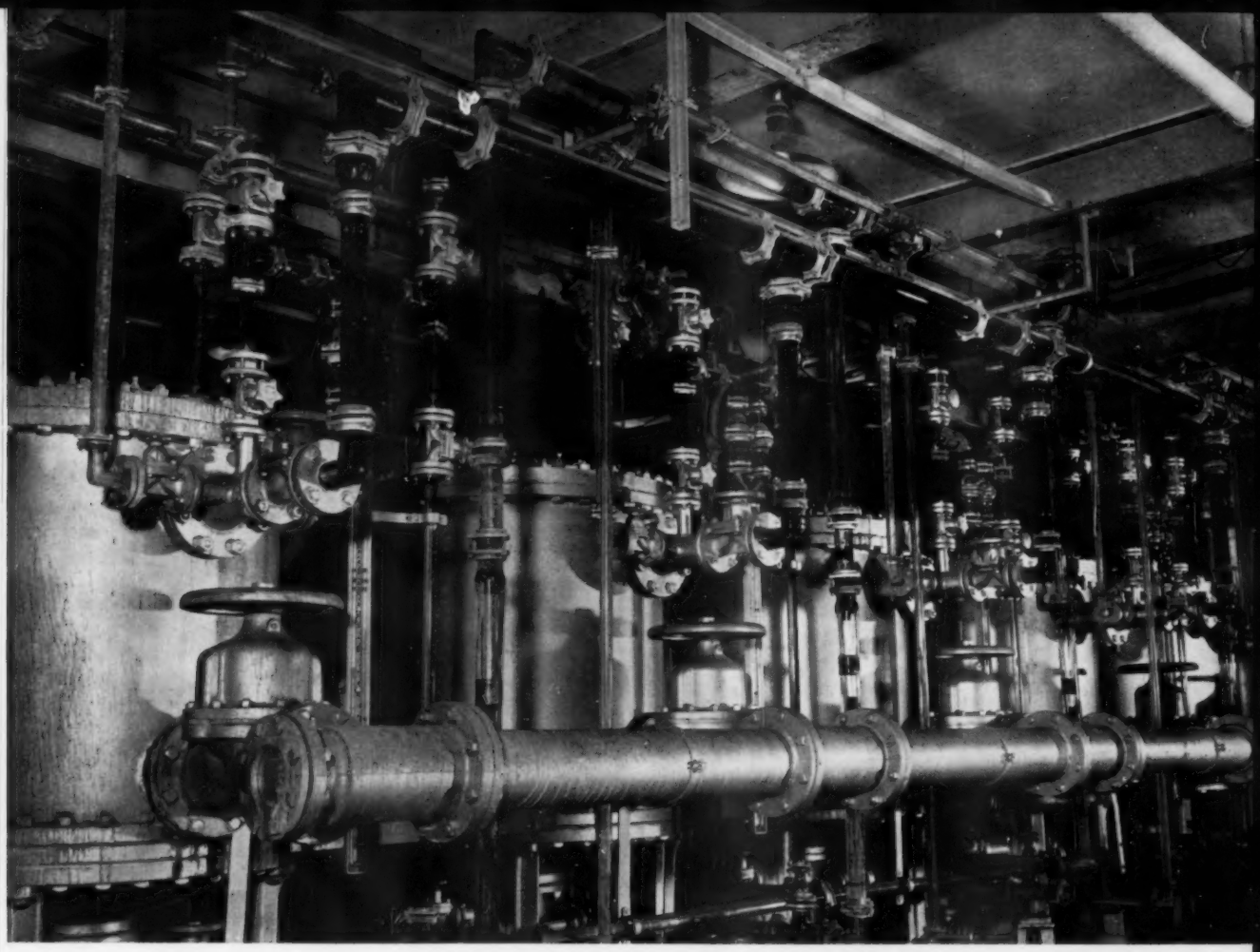
This glass pipe is tough enough to hammer nails into solid wood; it can withstand temperatures up to 450 F and extreme thermal stresses due to its low coefficient of expansion. It is lighter than many other piping materials, adaptable to all processing lines, and, most important, it can withstand nearly all corrosive fluids. Easy to install and clean, this pipe is transparent and has extremely low maintenance costs. For many processing industries it has become the answer to an engineer's prayer.

In relatively few years, glass pipe has come into extensive use in hundreds of chemical processing plants, in food and beverage processing companies, in photoengraving shops and industrial and educational laboratories. Wineries, pharmaceutical houses, pulp mills, textile finishing plants and dairy product plants have installed miles of glass pipe to solve their processing problems. Why the switch to glass pipe? And why, once glass pipe has been installed, the requests for further installations? The following, citing actual installation facts, is intended to answer these questions.

For practical purposes, a discussion of the corrosive-resistant properties of glass pipe can be very simple. It is attacked by so few reagents we can correctly say it is measurably affected only by hydrofluoric acid, phosphoric acid with traces of fluorides, and hot alkalis. Such acids as sulphuric, nitric and hydrochloric can be handled alone or in mixtures, at temperatures up to 450 F. Alkaline solutions such as strong soda bleach (150 gm/liter NaOCl [pH about 12]) can easily be handled at low temperatures in glass pipe.

A chemical processing plant in Spartanburg, S. C., has been handling 150 gpl NaOCl in the same double-pipe glass jacketed heat exchanger for 11 years without any corrosive effect in the glass tubing, which is actually thin-walled pipe. Similar pipe and heat exchangers are widely used in the manufacture of soda bleach, and the same shell and tube heat exchanger is recommended for customer use in cooling bleaches by some of the country's major producers of bleach materials.

Glass piping offers a wide range of operating temperatures. The ability of such glass pipe to withstand thermal shock is due to its very low lineal coefficient of expansion—a pipeline 100 ft long will expand or con-



tract only 0.22 in. for a 100 F temperature change. This characteristic eliminates the need for expensive expansion joints in a normal pipeline.

Table I lists the normal working pressures, maximum sudden temperature differentials and maximum operating temperatures of tempered glass pipe. Where temperatures do not exceed 250 F, precautions need not be taken; if operation is in the range of 250-450 F, insulation is necessary to prevent exceeding the maximum sudden temperature differential ratings. In Tennessee a manufacturer of explosives handles 250-300 F residual 71 per cent H_2SO_4 in tempered glass pipelines where ordinary corrosion-resistant piping material failed after a few months of operation.

In nearly all installations of glass pipe, visibility is a source of operating convenience, even when a process does not necessarily depend on visual reading of process conditions. Where sanitary requirements are enforced, as in food and dairy plants, visual inspection of processing lines is often essential to the conditions of the operation.

In dyeline use it is highly important to know if a line is clean after each and every use. A North Carolina textile finishing plant found the visibility advantage of glass pipe extremely useful in their dyeing and finishing

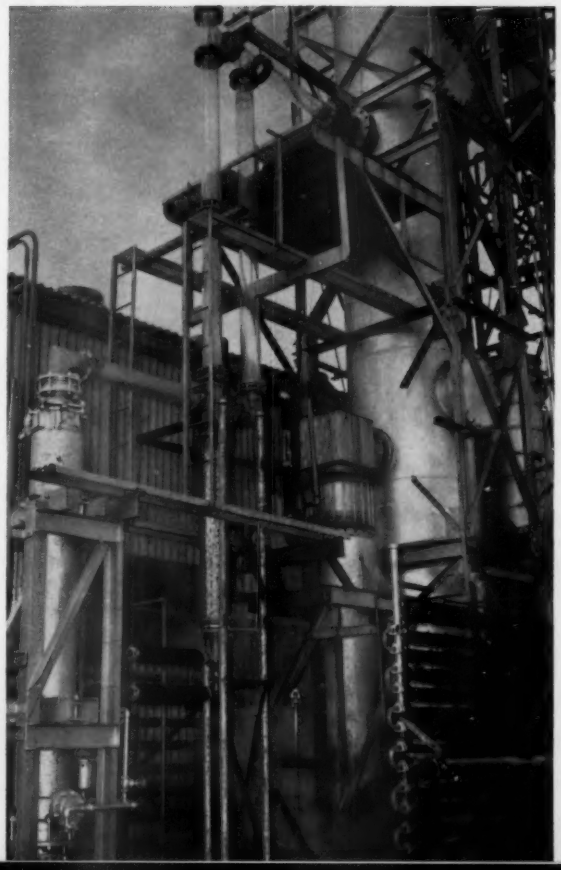


Fig. 3. Top of page: Hydrogen peroxide does not affect these glass pipelines installed at Buffalo chemical plant

Fig. 4. This Mississippi chemical plant uses 6-in. glass pipe to convey chlorinated hydrocarbons through glass columns

Fig. 5. Recovery of rare earths at this midwest chemical plant is the job that is assigned to these 6-in. glass pipes

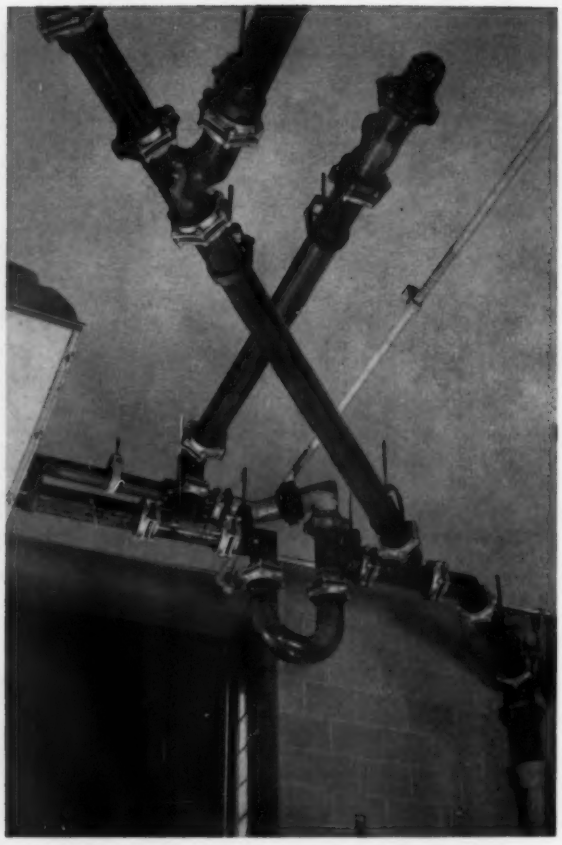


Fig. 6. Glass is used exclusively for drainlines from its photoengraving department by a midwestern newspaper

plant. This particular company now uses glass pipe for other process applications (such as alum handling) and for drainlines where metallic drainlines consistently failed. They also recover waste heat in glass shell and tube heat exchangers, transferring the heat to fresh water.

Another characteristic of glass piping advantageous to the plant engineer is its superior surface smoothness which eliminates or discourages scale build-up. If sedimentation does occur it can be observed easily and the need for cleaning known. Glass can be readily cleaned and sterilized in place, without expensive down time.

Advantages of tempered glass pipe have been recognized in those industries where process contamination must be avoided. Glass pipe is unaffected by molds, fungi or bacteria, making it particularly suitable for exacting pharmaceutical and canned and frozen food production. A New Jersey frozen foods manufacturer uses glass pipe for pumping fresh lima beans, peas and other vegetables to and from vats for freezing. Visibility plus sanitation requirements met by glass pipe are important here.

Glass pipe is lighter than many other piping materials. A 10-ft length of 2-in. glass pipe weighs 13 lbs. Installation of glass pipe is simple and quick—and economical, since fewer hangers or supports are needed and labor costs are cut. Overall maintenance is extremely low.

Chemical Industries—Because of its excellent resistance to nearly all corrosive fluids, glass piping has been most extensively used by the chemical processing industry, where corrosive acids, gases, oils and other fluids are commonly used.

Tempered glass pipe has frequently been called upon to solve extreme corrosion problems such as those at a rubber processing plant in the middle Atlantic area, where combinations of hydrochloric acid, carbon tetrachloride and chlorine are encountered.

In 1949, after extensive investigation and testing of various metallic and non-metallic piping materials, this company concluded that glass pipe was suitable for this application. It was inert to all chemicals involved, could withstand the high temperatures demanded and was unaffected by weather (half the entire installation of piping was to be outside the plant). Product purity could be easily checked visually, and there was no chance of metallic contamination of the product.

On the West Coast a chemical processing company was faced with another corrosive problem—one that was answered satisfactorily by glass piping. Here it was necessary to have one piping material to handle dilute sulphuric acid, mixed acids and chlorinated hydrocarbons. Lead pipe had previously been used, with frequent and costly replacements. Now 500 ft of 2-in. tempered glass pipe are handling the assignment without trouble.

A chemical company in Louisiana has used glass pipe lines to solve a particularly tricky processing problem. They had to take chlorinated resins ranging in temperature from 70 to 250 F from vats, using 15-in. Hg vacuum to move the product. They have used

Fig. 7. Another example of versatility of glass equipment is this shell and tube heat exchanger. It is installed at a dye finishing operation in a southern textile mill where its job is to recover heat from waste acids used in process

tempered glass piping for over three years, and recently decided to use it exclusively in their Mississippi plant.

Photoengraving and Laboratory Drainlines—The photoengraving industry has long recognized the value of glass pipe lines for draining their exceedingly corrosive etching acids. The visibility factor is also important, since in photoengraving there is occasional stoppage of drains due to slush concentrates. Glass sink traps and lines enable immediate determination of any stoppage; often the line plug can be removed without down time.

Large daily newspapers have found glass drainlines invaluable in their photoengraving departments. A large New York City firm which publishes magazines and technical books has glass drainlines running from its 11th floor to the basement; this installation has handled corrosive acids without trouble for 6 years.

One Chicago daily replaced its metal drainlines with glass in a small section of its photoengraving department, and recently installed glass drainlines for the entire operation. A major manufacturer of photoengraving equipment gives instructions for installing glass drainlines with all equipment sold.

In the educational and industrial research field, more and more laboratories are using glass drainlines. A new pharmacy building of a southern university is completely equipped with glass drainlines, including glass non-siphoning cap-type sink traps.

Although glass drainlines represent a higher initial cost than metal drainlines, plumbing contractors agree that glass saves immensely in labor costs. One mid-Western plumbing contractor stated that while it takes two man hours to pack one bell and spigot joint in a metal drainline, a total of eight glass connections can be made in one man hour. Glass also comes in 10-ft sections, each of which weighs less than an average 4-ft section of metal pipe, and each of which can easily be fabricated to desired lengths.

Comparative drainline maintenance costs are generally in favor of glass pipe under ordinary conditions, and even more so where extremely corrosive conditions are experienced. Based on first cost, installation cost and life of the material, glass pipe generally gives the lowest overall cost where corrosion is a factor.

Pulp Mills—Prior to 1950 the use of glass pipe in pulp and paper mills was unknown except for minor sight flow applications. The expansion of this industry, and its increasing use of corrosive bleaches, has proved the practicability of glass pipe in the industry. Figures 1

Table I. Some characteristics of glass pipe for industrial use

Pipe Size In.	Max. Recommended Working Pressure	Max. Sudden Temp. Differential	Max. Operating Temperatures[1]
1	50 psi	200 F	450 F
1½	50 psi	200 F	450 F
2	50 psi	200 F	450 F
3	50 psi	200 F	450 F
4	35 psi	175 F	450 F
6	20 psi	160 F	450 F

[1]Glass must be insulated or protected so that maximum sudden temperature differential figures are not exceeded.

Fig. 8. Food plants, too, get into the act with glass pipe. In this upper New York state plant the pipe is used to convey brines to pickling vats. The flexible mounting allows single hose, by means of swivel fixture, to reach four vats

and 2 show how mercury amalgam (sp. gr. 13.6) is handled beneath De Nora type chlorine cells in such pipe. This amalgam contains such corrosives as NaCl, HCl, Cl_2, and NaOH.

This particular application in early 1954 in a southern pulp mill has led to the further installation of a mile of Pyrex pipe in various sizes for NaOCl bleach, chlorine, chlorine water and sulphuric acid. Another southern paper mill has installed several thousand feet of assorted sizes of glass pipe for handling chlorine dioxide vapor and liquid solutions. Several other pulp mills use glass dilution and cooling equipment where H_2SO_4 is bought at 66 deg Be and used at 60 deg Be.

Textile Dye Houses—Tempered glass pipe has found extensive use in textile mills doing their own dyeing. Dye shadings are extremely sensitive to metallic contamination, and it is essential in a dyeing operation that the colors remain true throughout the run. There is no contamination factor in glass pipe, and textile manufacturers have found an additional benefit from the visibility factor and ease of cleaning glass pipe.

Glass dye lines can be easily cleaned by rinsing with cold water; speck dyeing is entirely eliminated because operators can visually check dye line cleanliness. A Massachusetts textile mill installed 2500 ft of glass pipe recently to handle dyes and was so pleased at the results that glass pipe is presently ordered for all conveying procedures involving corrosives.

Viscous Fluid Handling — The smooth surface of glass makes it an ideal material for handling viscous fluids. A manufacturer of baby lotion, for instance, found that glass pipe, used for conveying the lotion from the mixing tanks to the packing line, assured noncontamination of his product, easy visual checks on product purity, and, by applying heat directly to the glass pipe, greater volume handling of the product.

Mustard is both viscous and extremely corrosive—glass pipe has been found by one of the country's largest manufacturers of packed foods to handle it most successfully. Latex, an extremely viscous fluid, is presently being conveyed in several major rubber manufacturing plants via glass pipe. A southern synthetic rubber company replaced the majority of its lines with glass pipe and found that instead of taking down and cleaning lines several times per week as had been necessary, cleaning was necessary once a year. This company concluded that the new installation, including actual installation costs, paid for itself in less than six months.

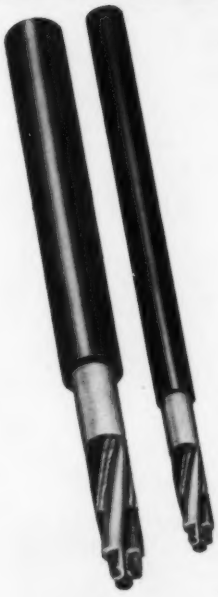
Rayon Industry — This industry in particular has been helped by glass. Godet wheels of glass are used extensively by rayon manufacturers—the highly polished surface of the glass withstands the constant acid attack of threads fresh from the bath; glass is non-absorbent and will not swell or warp from continuous contact with acidic solutions; dimensional stability is assured through the low coefficient of expansion of the glass wheels.

In the viscose rayon industry, hot and dilute sulphuric acid with sludging characteristics is widely used. Some major manufacturers of rayon are finding glass pipe ideal for handling this liquid, as well as conveying bleach solutions. For these applications glass generally replaced lead or lead-lined steel. A glass shell and tube steam heater has operated at one plant for a year without cleaning, where other non-metallic heat exchangers had to be cleaned chemically or manually every four to six weeks.

Installation and Maintenance—Glass pipe and fit-

(Continued on page 287)

LOOK AT THIS Sure, trucks shouldn't run over electric cords—but they do! *Rome* cords can take this kind of punishment.



Rome's flexible cords are tough!

When wire fails, you lose two ways—from job delay and replacement costs. To cut this kind of expense to an absolute minimum, specify a Rome flexible cord next time. These rugged cords last much longer than ordinary cords and are your assurance of fewer on-the-job failures.

Your biggest savings come from using Rome cords on the really hard-service jobs. A tough Neoprene jacket gives the cord its outstanding resistance to moisture, abrasion, oils, acids, sunlight, and even flame. Use Rome 50 for normal duty and Rome 60 when you need an especially rugged cord for extra heavy duty. The table below describes the standard Rome cords now available.

Contact your nearest Rome Cable representative for more information—or write to Department 541-B and ask for Catalog PORT-1. Rome Cable Corporation, Rome, N. Y.

FOR RUGGED OUTDOOR DUTY
You get built-in protection against outdoor wire hazards with Rome flexible cords. Tough Neoprene jacketing withstands effects of sunlight, abrasion, and moisture.

TYPE "SO"—600 VOLTS					
SIZE A.W.G	STRANDING	TWO CONDUCTOR		THREE CONDUCTOR	
		Approx. O. D.	Approx. Net Wt. Per M'	Approx. O. D.	Approx. Net Wt. Per M'
18	42/34	.40	95 lbs.	.41	105 lbs.
16	67/34	.41	100 lbs.	.43	120 lbs.
14	41/30	.53	160 lbs.	.56	200 lbs.
12	65/30	.60	215 lbs.	.64	260 lbs.
10	105/30	.64	250 lbs.	.69	325 lbs.

TYPE "SJO" FLEXIBLE—300 VOLTS					
SIZE A.W.G.	STRANDING	TWO CONDUCTOR		THREE CONDUCTOR	
		Approx. O. D.	Approx. Net Wt. Per M'	Approx. O. D.	Approx. Net Wt. Per M'
18	16/30	.30	53 lbs.	.33	70 lbs.
16	26/30	.33	63 lbs.	.36	86 lbs.

TYPE "SJO" EXTRA FLEXIBLE—300 VOLTS					
SIZE A.W.G.	STRANDING	TWO CONDUCTOR		THREE CONDUCTOR	
		Approx. O. D.	Approx. Net Wt. Per M'	Approx. O. D.	Approx. Net Wt. Per M'
18	42/34	.30	50 lbs.	.33	70 lbs.
16	67/34	.33	61 lbs.	.36	86 lbs.

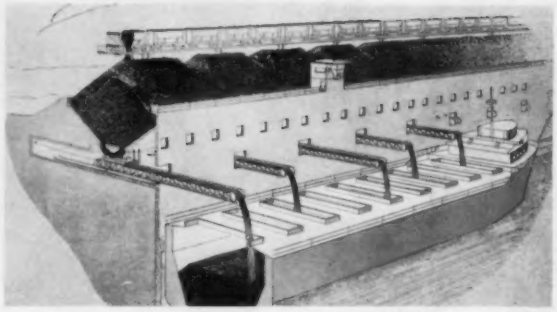
ROME CABLE
CORPORATION

For more facts circle 563 on Reply Card

Belt Conveyor System Will Load Ore Freighters Two at a Time

A SYSTEM OF 25 shuttle belt conveyors, the first of its kind ever used to load Great Lakes ore vessels, will be used to load taconite pellets at Erie Mining Company's Taconite Harbor, Minn. port facility. The loader, designed and built by the Link-Belt Company, is under construction. Two vessels can be loaded simultaneously at the dock.

The pellets arrive at the dock in rail cars, on an elevated track, and are emptied into a storage bin that extends the length of the dock. As they are removed from the hopper, by the conveyor belts under the hopper discharge openings, they are weighed and transported to the ship hatches. Each of the 25 shuttle belt conveyors on the 1200-ft dock is capable of loading taconite at the rate of 750 or 1500 long tons per hour, at belt speeds of 250 or 500 ft per minute.



Computer Installation Takes Over Multitude of Jobs in Transformer Plant

INITIAL OPERATION of an IBM 705 digital computer at the Sharon, Penna., Transformer Division plant of Westinghouse Electric Corporation culminated 25 man-years of preparatory work.

Analyzing procedures, developing systems to adequately use the 705, and programming these systems into language the machine can understand required the extensive work, which started in January 1955.

With the computer in operation, a system of electronic machines is available that can not only calculate and tabulate, but perform thousands of sequential operations and make planned decisions in a logical manner. Prior equipment could handle standardized operations, but the exceptions which make up a large part of many systems still required manual processing.

With no one application in the plant that would support a large scale computer installation, applications in the fields of payroll accounting, inventory control, issuance of manufacturing information to the shop were teamed with the transformer design function to share the computer.

Fed the required information, the 705 can prepare production follow copies, move tickets, feed-back cards, group leaders' records, identification tags and delivery receipts. Another aid furnished by the computer will be an analysis of parts activity so that active parts can be stocked on an economical basis and inactive parts removed from stock.

A complete payroll accounting system has been designed for the 705, including both hourly and salary payroll operations. The system used by the computer starts with punched cards and clock cards; it totals allowed and elapsed hours for each shop group each week, and calculates the percentage earned for incentive payment. After making specific deductions for each individual employee, the 705 writes the pay check and stub, and stores on tape the figures used to make up the payroll.

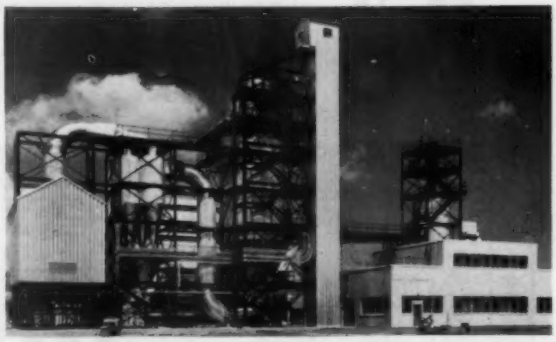
Spray Drying Enters the Starch Preparation Field With Stainless Equipment

A NEW SPRAY-DRYING CHAMBER and plant has recently been completed by Corn Products Sales Co., in Corpus Christi, Texas. The unit, specifically designed to produce instant starch, is the first application of spray drying to this field.

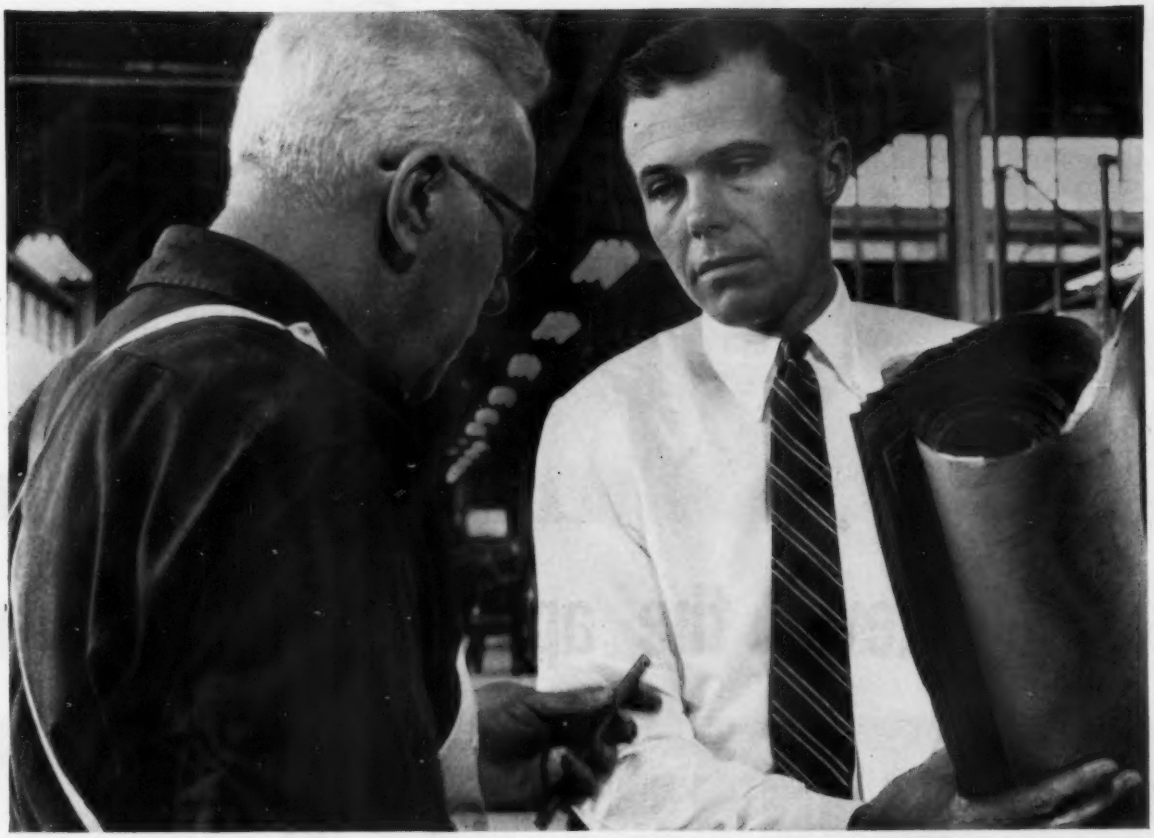
The chamber in which the starch is spray-dried is 24 ft in diameter, and rises 88 ft above the ground. In addition to the chamber, the installation includes a starch pre-cooking system and a separate packaging facility. Between the spray-drying chamber and the packaging house, a duct carries the starch through four high-efficiency collecting cyclones, which funnel the dried starch to the packaging area.

All operations in the plant are controlled from a single panel, and the system is so nearly automatic that only two men are required to control it.

Stainless steel enclosed systems safeguard the purity of the starch during processing. Sanitary piping transfers pre-cooked starch to the spray dryer's atomizing nozzles.



The installation was designed and built by the Chemical Plants Div. of Blaw-Knox Company. *(More News, p. 146.)*



Don't let your blueprints take the blame

TOO OFTEN costly production errors are blamed on hard-to-read blueprints. The real culprits, of course, are the old smudged drawings from which the prints were made.

However, a simple step makes such drawings capable of producing sharp, legible prints—*reproduce them on Kodagraph Autopositive Paper.* This photographic material gives you positive intermediates *directly* (no negative step)—sparkling intermediates even from soiled or weak-line originals.

Unlike your valuable drawings, they won't smudge or lose line density when used as "masters" in your print machine. They assure easy-to-read prints time after time—*pays you to make one of every drawing!*

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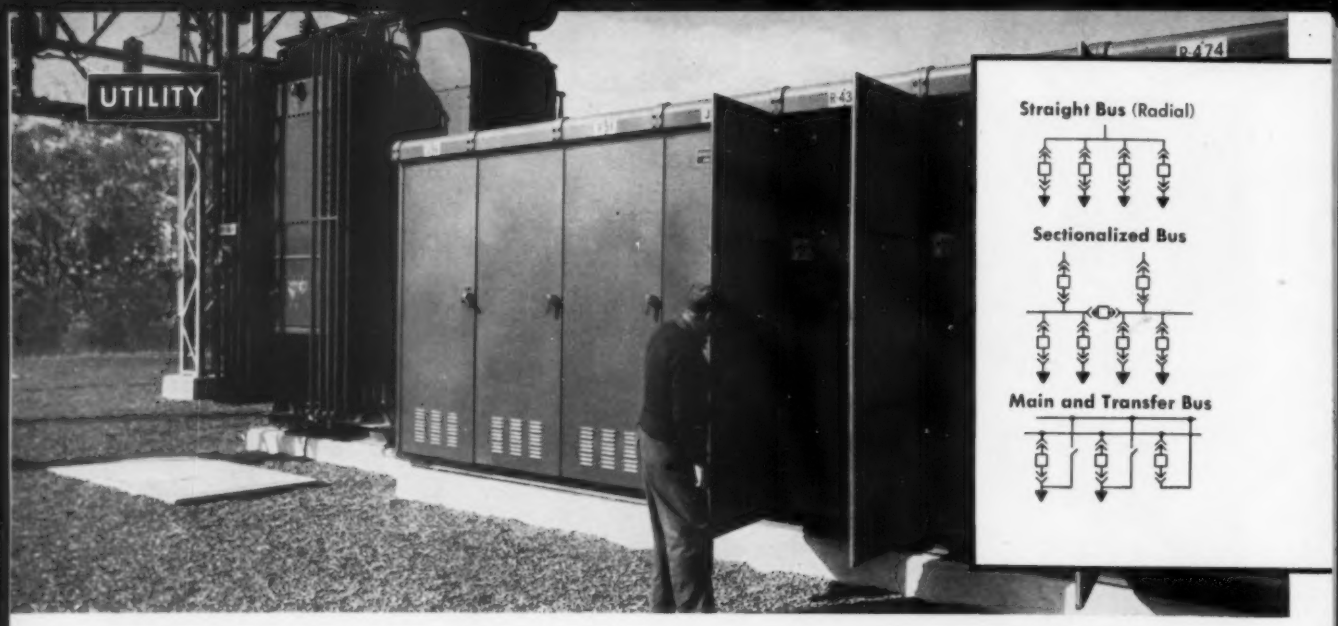
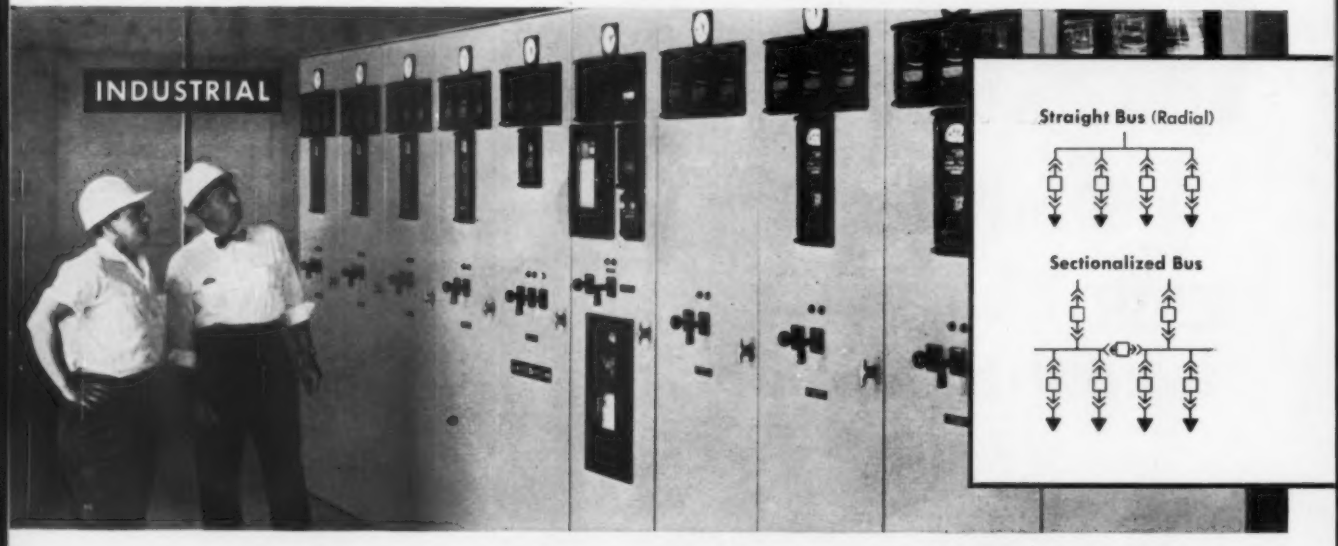
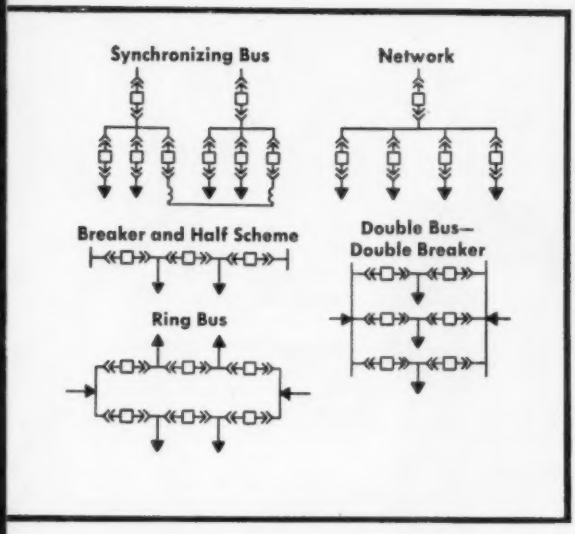


Whatever the application — General



General Electric Metal-clad Switchgear is being used more and more for commercial installations such as large buildings, department stores and shopping centers, where maximum protection and continuity of electric power service is important. These basic switching schemes meet the requirements of most installations.



FUNCTIONAL SWITCHING SCHEMES FOR ALL MEDIUM-VOLTAGE APPLICATIONS

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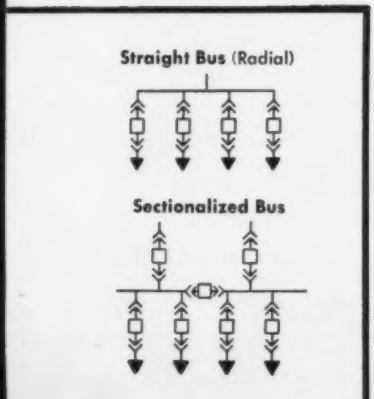
- Industrial Feeders
- A.C. Generator and Exciter Control
- Synchronous Motor Starting
- Induction Motor Starting
- Indoor and Outdoor Substations
- Mercury Arc Rectifiers
- Arc Furnace Service
- Capacitor Switching
- Synchronous Condenser Control

APPLICABLE FOR: Power House Auxiliary Motor Control—Main Generator Control for Small and Medium Steam, Hydro and Gas Turbine Plants—Utility Distribution Systems—Waterworks and Sewage Plants—Oil Pipeline Pumping Stations—Refineries—Manufacturing Plants of All Kinds—Armed Forces Installations—Large Commercial Buildings—Shopping Centers.

Electric Metal-clad Switchgear handles any switching problem—economically!

These two switching schemes meet the basic requirements of most industrial installations, including textile mills, refineries, mining operations, and automobile and similar manufacturing plants. For more extensive and specialized applications, refer to the additional switching schemes shown above.



General Electric factory-assembled Metal-clad Switchgear is the best answer for switching schemes in the medium-voltage range of 2400 to 13,800 volts.

This universal application, combined with the advantages offered by standardized unit design, greatly simplifies engineering and installation of metal-clad switchgear equipment. Maintenance and operation present fewer problems because personnel have only to learn the details of one type of equipment. And with standardized design, spare parts requirements are minimized because one set of parts will serve for all installations. Removable Magneblast circuit breakers of like rating, for example, are interchangeable, so that one spare unit can serve for emergency use on numerous circuits.

General Electric Metal-clad Switchgear is built for rugged duty. It provides maximum protection for electrical systems and the highest level of safety for personnel. For full information on its many "plus" features, see your local G-E Apparatus Sales Engineer, or write for Bulletin GEA-5664 to General Electric Company, Section 511-20, Schenectady 5, New York.

Progress Is Our Most Important Product

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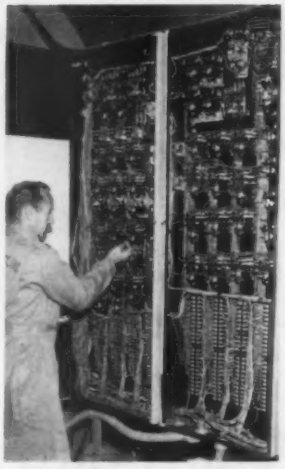
A "Brain" for Automatic Riveting

COMPLEX circuitry comprises a portion of the electronic brain of a new Drivmatic riveting machine at Northrop Aircraft, Inc. Holes punched in 35 mm tapes activate electronic eyes that deliver messages to the brain for control of the machine.

The circuits in the brain activate three driving mechanisms: one system raises and lowers the riveter carriage, another accomplishes transverse travel of the carriage and a third powers the hydraulic system driving the carriage longitudinally.



Checking Tool for Rockets

A VERTICAL check-out tool, at Martin Aircraft's Baltimore facility, has five floor levels located at heights suitable for working on areas of the Vanguard, the earth satellite launching rocket. Chief purpose of the tool is to simulate static firing.

Built of structural steel and reinforced concrete, the structure is sheathed with sheet steel, with translucent lighting panels. The entire building, 29 ft wide, 35 ft long and 97 ft high, is so designed that it can be disassembled and erected at another site.

New Engine Plant Requires Ventilation Ductwork by the Mile

NINE MILES of steel ventilating ducts have been installed in the new Ford Motor Plant at Lima, Ohio. The Wheeling Corrugating Co., supplier of the galvanized sheets from which the ducts were fabricated, states that 475 tons of steel were required to form the ducts for the project.

The production area of the plant has a tempered and filtered air system, serviced by twenty-four ventilating fans located in a common rooftop equipment room. This room is 50 ft wide, and runs the entire length of the building.

Another unit, the Employees Facilities building, is serviced by filtered, heated, and conditioned air which is distributed by rectangular, above-ceiling ducts with standard grilles and diffuser ceiling fixtures.

The plant's administration building is serviced by low velocity systems of above-ceiling ductwork, with air diffused through ceiling panels from low velocity modular vents.

Ford expects to put the 888,000-sq ft engine plant into operation later this year.

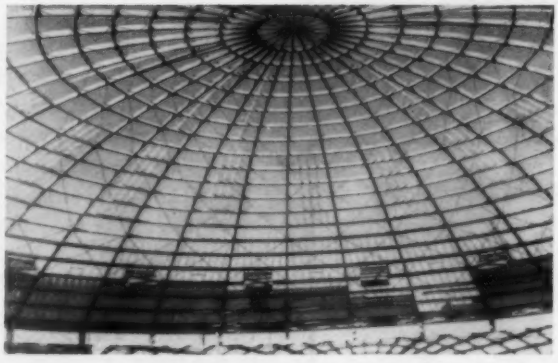
Field House Dome Sets Record for Size of Laminated Wood Arch Construction

LATEST RECORD-BREAKER among wood structures being built with large areas of post-free space is a spectacular timber dome just completed at Bozeman, Montana. The 300-ft diameter main arena of Montana State College's physical education center is of glued laminated timber construction.

The dome structure is a webbing of glued laminated arches and purlins, 90 ft high at its center. It rests on columns standing outside the perimeter wall of the arena. Lumber required for the dome system which was fabricated and erected by Timber Structures, Inc., Portland, Ore., amounted to 150,000 board feet. The arches were manufactured in segments 51 ft long, and shipped to the job site by rail.

Construction of the arena was completed on a nine-month schedule; erection of the dome itself took only 10 weeks. The arches were assembled on the ground in pairs—with purlins, sub-purlins and cross bracing in place. The sections were hoisted into position by two 100-ft boom cranes.

Cost of the structural glued laminated dome in place was $2.20 per sq ft. Total cost of the main arena, including the balcony, locker rooms, floors, concourse, heating and ventilating and special facilities, was $1,222,206, or $9.90 per sq ft.



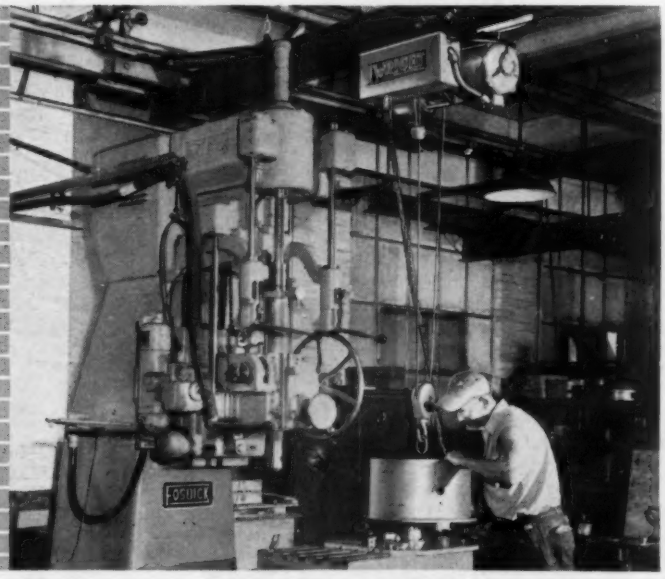
For more facts circle 566 on Reply Card ——→

ACCO products

The WRIGHT Hoists for Dependability

NOW! a New 2-Speed WRIGHT Frame 1 Hoist permits precise, gentle positioning of production work

The picture below shows a WRIGHT Frame #1, 2-speed Electric Hoist placing heavy equipment gently on a very precise machine. This is just one of the applications for which this hoist is particularly well suited.



CAPACITIES 500 TO 2000 LBS

Compare the flexibility, versatility and dependability of these WRIGHT Hoists with other types of hoists:

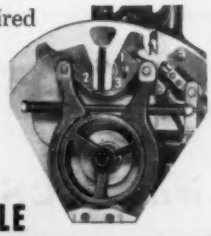
2 SPEEDS • A fast lifting and lowering speed—and a slow speed (¼ the rate of the fast speed) for precise, gentle positioning of work—accomplished by use of 1800/450 RPM motors.

FLEXIBILITY • Travel of hoists on rail or jibs is limited only by the availability of electrical service.

SERVICE AVAILABILITY • Failure of power source is quickly and easily remedied for individual electric hoists.

MAINTENANCE • Very little maintenance required and this is easily handled on WRIGHT hoists.

Brake adjustment on all WRIGHT *Speedway* Electric Hoists is foolproof. There is nothing to adjust but the cam!



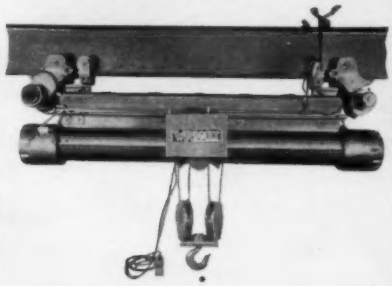
ACCO

Wright Hoist Division
AMERICAN CHAIN & CABLE

York, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

EXTRA-LONG-LIFT ELECTRIC HOISTS

Single layer of cable in machine-grooved drum



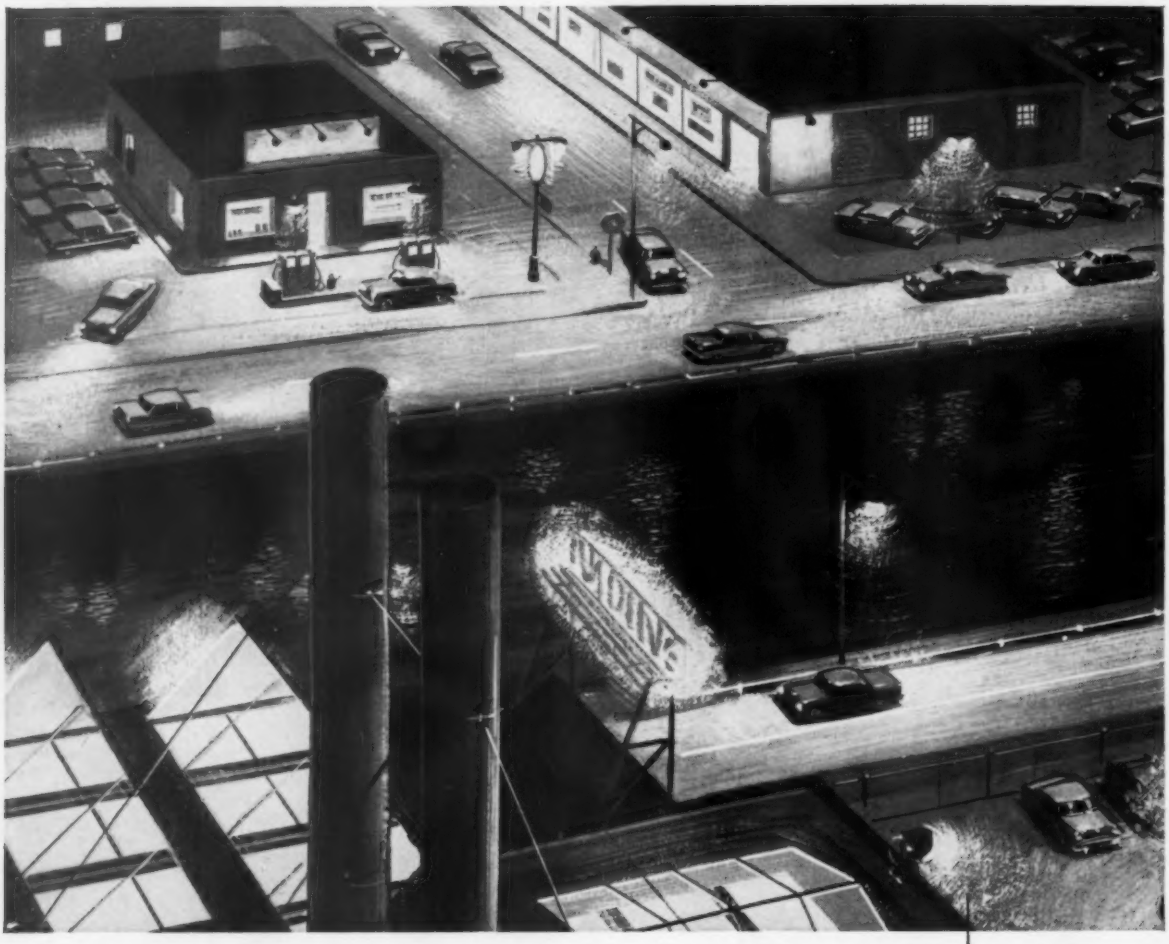
3 TON	95 FEET
2 TON	107 FEET
6 TON	115 FEET
1 TON	120 FEET
5 & 10 TON	125 FEET
4 TO 7½ TON	135 FEET

***Write** for complete information on the sensational new WRIGHT 2-Speed Hoist and the Extra-Long-Lift Hoist shown above.*

Better Value

INDOORS AND OUT

LAMPS ARE IN SERVICE THAN



They're Job-Tailored to give you the most mercury light for your money

From Westinghouse developments like those below, you can see how the built-in quality of Westinghouse Mercury Lamps gives *more light when new, more light throughout life, as well as guaranteed long life.*

- Thorium-Coated Electrodes provide HIGHER LIGHT OUTPUT
- Molybdenum Ribbon Seals assure GREATER DEPENDABILITY, LONGER LIFE
- Hi-Temp Life-Time Bases eliminate INSTALLATION AND SERVICE BREAKAGE
- *Weather Duty® construction with special "hard" glass. Outside installations can't be harmed by snow, sleet or rain even when lamps are installed without protective coverings . . . or inside by fumes, or dripping condensation.*

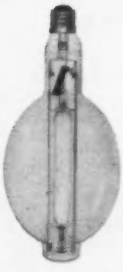
For recommendations for using the most complete line of mercury lighting—for the right kind of lamp for the job—call your nearest Westinghouse lamp supplier or write: *Westinghouse Lamp Division, Dept. JI, Bloomfield, N. J.*

B-H18: 700 W. Fluorescent-Mercury Lamp. Color-corrected Golden-White light for general purposes, flood and street lighting. A Westinghouse exclusive.

YOU CAN BE SURE...IF IT'S Westinghouse

MORE WESTINGHOUSE MERCURY ALL OTHER BRANDS COMBINED

E-H1: 400 W. Mercury Lamp. Most widely used today. For interior and street lighting. **E-H1-Y:** Built-in clear yellow filter warns of road hazards.



A-H12-WD; A-H15-WD:1,000W. Weather Duty Mercury Lamp. Recommended for all interior and exterior applications. Widely used for industrial high bay lighting. Weather proof for heavy duty service.

A-H1-WD: 400 W. Weather Duty Mercury Lamp. Recommended for general purposes, flood and street lighting. Weather proof for heavy duty service.

P-H1: 400 W. Semi-Reflector Mercury Lamp. Color-corrected Golden-White for all interior uses. Ideal for areas of high dust concentration.

C-H12-WD; B-H15-WD:1,000W. Weather Duty Fluorescent-Mercury Lamp. Color-corrected Golden-White light for general interior and floodlighting. Weather proof for heavy duty service.

J-H1: 400 W. Fluorescent-Mercury Lamp. Golden-White light is color-corrected for interior and street applications. **J-H1-Y:** Rich, yellow light to identify road hazards. Ideal substitute for sodium installations.

For more facts circle 567 on Reply Card

NEW PLANT CONSTRUCTION — advance information on location, costs

Wilmington, Calif.—Shell Oil Co., subsidiary of the Shell Chemical Corp., 50 W. 50th St., New York, N. Y., plans to construct a new platforming unit at its refinery in Wilmington, Calif. Kaiser Engineering Division of Henry J. Kaiser Co., 1924 Broadway, Oakland, Calif., has been awarded the contract to construct the new unit which is scheduled to be in operation late in 1958.

Lafayette, Ind.—Eli Lilly & Co., 740 S. Alabama St., Indianapolis, Ind., pharmaceuticals, biologicals and antibiotics, has announced plans for a major expansion in company facilities for the increase in production of fermentation facilities at its Tippecanoe Laboratories, near here. Preliminary engineering work is under way and construction will begin this summer. Cost will be $2 million.

Lake Charles, La.—Petroleum Chemicals Inc., a jointly owned company of Cities Service Co., and Continental Oil Co., with offices at 806 Perdido St., New Orleans, La., plans to construct a new multi-million dollar petrochemical plant to produce ethylene for industrial use. The Lummus Co., 385 Madison Ave., New York City, N. Y., is the construction engineering firm.

Baltimore, Md.—Pemco Corp., manufacturers of porcelain enamels, glazes, oxides and colors, has announced the construction of a new laboratory building. Facilities will include a floor area of 22,000 sq ft and be designed so that new wings on either side may be added when required. Total investment will exceed $500,000.

Andover, Mass.—Sylvania Electric Products, Inc., 1740 Broadway, New York 19, N. Y., plans to construct a large research and production center on a 150-acre site recently purchased. A new corporation, Sylvania-Corning Nuclear Corp., will be organized as a jointly owned company by Sylvania and Corning Glass Works, 1946 Crystal St., Corning, N. Y. Plant will occupy five buildings totalling 150,000 sq ft and will be designed to concentrate on the development and production of nuclear fuel elements and components. Plant is expected to be in operation by early 1958 at an initial cost of $5 million.

Savage, Minn.—The Green Giant Co., subsidiary of the Rock Valley Canning Co., LeSueur, Minn., has announced plans for the construction of new can manufacturing plant. Construction of the new facility with 50,000 sq ft of floor space will begin soon for completion in 1958. Company plans an expenditure in excess of $2.5 million.

Columbus, Miss.—Hooker Electrochemical Co., Oldbury Division, 1940 Ward St., Niagara Falls, N. Y., plans expansion of facilities for production of sodium chlorate. Additional electrolytic cells and related electrical equipment, plus finishing and bulk storage capacity will cost $1 million.

Pascagoula, Miss.—H. K. Porter Co., Inc., Alcoa Building, Pittsburgh 19, Pa., plans to construct a new chemical plant for the production of magnesia and basic refractory products. Construction of the plant will get under way soon. Plant is scheduled for completion by early 1958 at a reported cost in excess of $8 million.

Louisiana, Mo.—Hercules Powder Co. and Imperial Chemical Industries Ltd., have announced the formation of a new company, Hawthorn Chemical Corp., jointly owned, for the manufacture of methyl mathacylate, a chemical used in the production of plastics. New company plans to build a new plant with an annual capacity of 35 million pounds at a reported cost of $11 million. It will adjoin the Missouri Ammonia Works, owned and operated by Hercules Powder Co.

New Market, N. J.—Union Steel Corp., 2146 Stanley Terrace, Union, N. J., subsidiary of the Hind Steel Co., Inc., has announced a major expansion of existing facilities for the manufacture of welded stainless steel pipe and tubing. When completed the plant is expected to cost about $9 million.

Plainfield, N. J. — Wood Newspaper Machinery Corp., plans to build a new 60,000-sq ft plant in Middlesex Borough. Work will get under way soon and will be completed in 1958. Company has retained the Lawrence Construction Co., of Union, N. J., as construction engineer of the new plant. Cost of the facility will probably exceed $1 million.

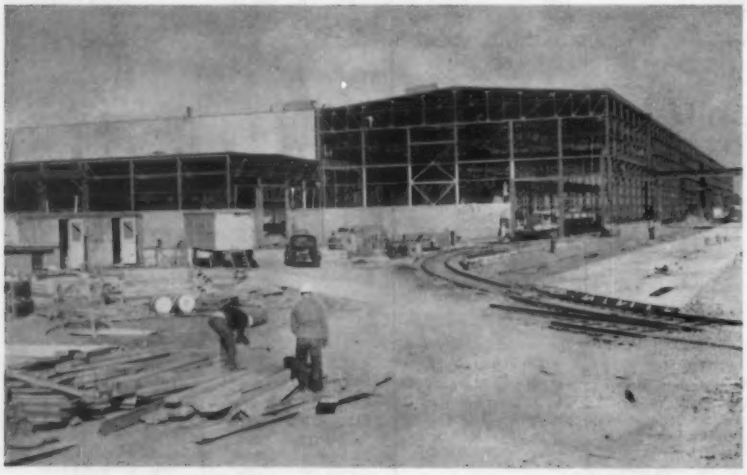
Trenton, N. J.—Phoenix Iron & Steel Co., subsidiary of Barium Steel Corp., Phoenixville, Pa., has announced plans for the construction of an integrated steel plant on a 1,000-acre site recently acquired from the Pennsylvania Railroad. Initial plans call for blast furnace and oxygen blowing facilities to produce ingots for company's plate mills at Harrisburg and structural mills at Phoenixville, Pa. Plant when completed will represent a multi-million dollar investment.

Buffalo, N. Y.—Socony-Mobil Oil Co., 26 Broadway, New York, N. Y., plans to construct a new sulfuric acid alkylation plant on local site here. Plant when completed in 1958 will cost an estimated $2 million. Contract has been awarded to the M. W. Kellogg Co., 711 Third Ave., New York, N. Y., for engineering and construction work on the plant.

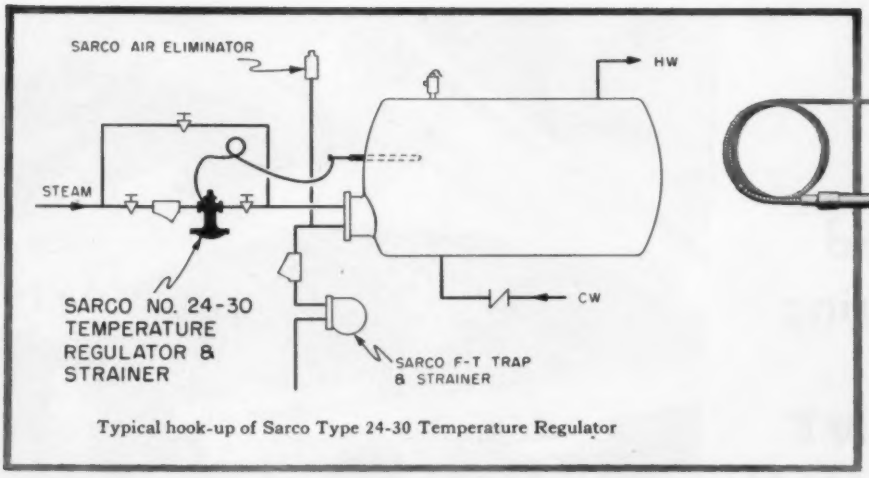
Massena, N. Y.—Reynolds Metals Co., Reynolds Metals Building, Richmond, Va., plans to construct a new aluminum reduction plant at Roosevelt Town, seven miles east of here. New plant will have an annual capacity of 200 million pounds and will be located on a 1,700-acre tract of land owned by the company. Plant will cost approximately $88 million when completed in 1959.

New York, N. Y.—International Nickel Co., Inc., 71 Wall St., New York 5, N. Y., has authorized plans for the construction of a new International Nickel Co., of Canada, Ltd., concentrating plant on a large tract of land, adjacent to company's Levack mine,

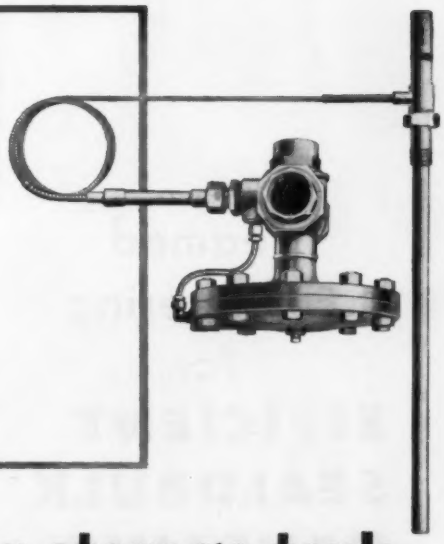
(Continued on page 246)



Chrysler Corporation's new Stamping Plant at Twinsburg, Ohio, nears completion. Eight of 28 major press lines will run under partial plant output this month



Typical hook-up of Sarco Type 24-30 Temperature Regulator



HOT WATER...in your storage tank

...when you want it...*and at minimum cost!*

That's the performance you get when this Sarco Temperature Regulator stands guard on your water heater.

With fuel representing about 50% of your total direct power costs, it's important that you *get hot water at lowest cost per wash.*

Here's how the Sarco 24-30 Temperature Regulator does the job:

NO OVERHEATING – during periods of no draw-off. The single seated valve shuts tight, prevents creeping of temperature.

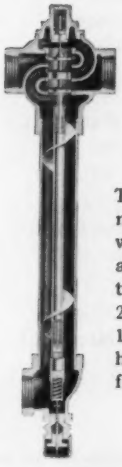
LOW INSTALLATION COST – the T R 24-30 is self-contained and self-operated, no need to install compressed air or electric lines.

CLOSE TEMPERATURE CONTROL – thermostat actuates internal pilot valve which immediately opens or closes main valve.

LOW-MAINTENANCE PACKLESS SEALS – trouble-free design eliminates stuffing boxes, no repacking, no sticking or leakage of exposed valve stems.

WIDE RANGE OF ADJUSTMENT—you can adjust this temperature regulator 25° higher or lower than the temperature setting.

So, if you're not satisfied with your hot water service, call your local Sarco representative or write for Bulletin. Sarco Company, Inc., Empire State Bldg., New York 1, N. Y.



Need Tempered Water ?

This Sarco Water Blender automatically mixes hot and cold water, delivers blended water at any desired temperature. Factory set for any temperature to 200° F., is easily adjusted to 15° F. lower and up to 40° F. higher than factory setting. Ask for Bulletin 800.

SARCO

SAVES STEAM

improves product quality and output

2046-B

Only Sarco Makes All 5 Types

That's why Sarco can give impartial advice on proper steam trap selection.

Thermodynamic Steam Traps

Thermostatic Steam Traps

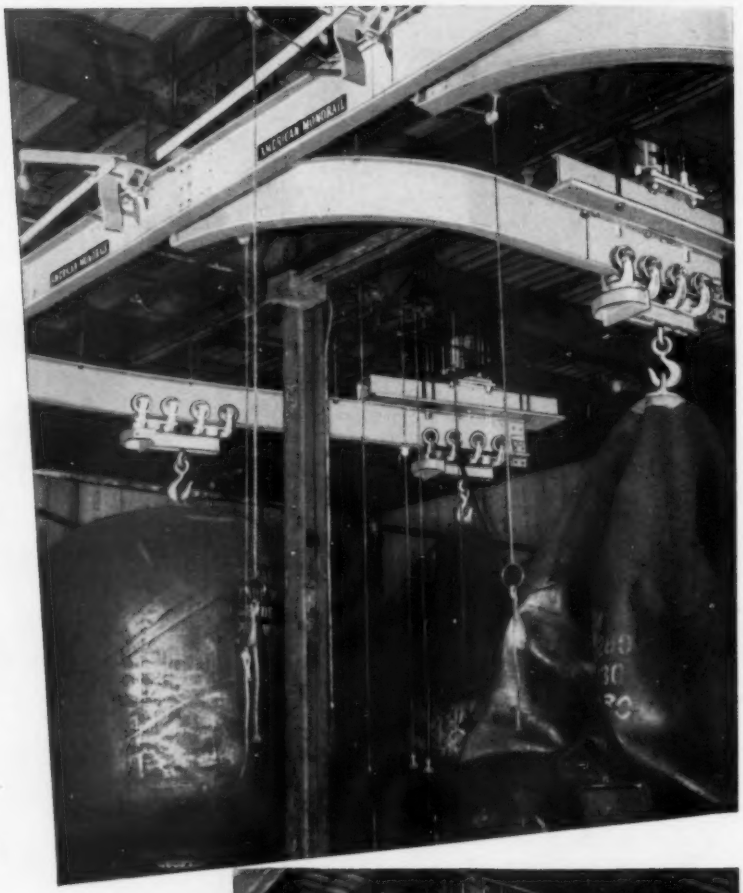
Float Thermostatic Steam Traps

Liquid Expansion Steam Traps

Camlift Bucket Steam Traps

For more facts circle 568 on Reply Card

Teamed Engineering for EFFICIENT SEALDBULK HANDLING



U. S. Rubber Company and American MonoRail Engineers teamed up to develop this system.

The Sealdbin containers, a product of U. S. Rubber Co., each hold 11,000 pounds of costly carbon black. This American MonoRail System moves the Sealdbins from flat cars or trucks to special stations for discharge. Empty deflated containers are returned to the supplier for re-use.

Working together this expert team has minimized manual labor, time, and waste.

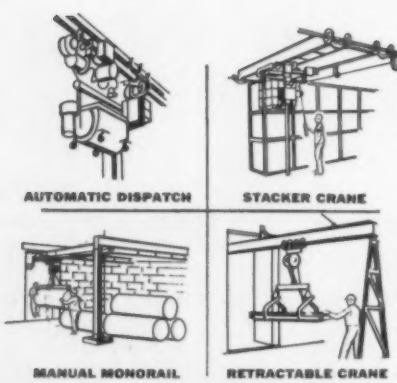
If you have a materials handling problem, call your nearby MonoRail Engineer or write us.

Send for Bulletin C-1.

US RUBBER

Member of Materials Handling Institute and MonoRail Mfrs. Assn.

For Power Driven Conveyors, Use Landahl Chainless Conveyors



AMERICAN MONORAIL COMPANY

OVERHEAD HANDLING EQUIPMENT

13123 ATHENS AVENUE • CLEVELAND 7, OHIO

(IN CANADA—CANADIAN MONORAIL CO., LTD., GALT, ONT.)

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MASONITE

PANELGROOVE

...for easy-come, easy-go partitions!

Relocating men, machines and equipment?

Be glad your partitions are made with big Masonite panels. They're straight and strong... take a lot of knockabout abuse. They can be painted or repainted in a jiffy. They don't split, splinter or crack. And they're easy to cut and fit.

Your lumber dealer offers a variety of types, textures and thicknesses of these versatile Masonite hardboards.

Many more cost-cutting uses for Masonite® panels:

- Pallets and trays
- Mats and runners
- Bins and cabinets
- Chutes and conveyors
- Work surfaces
- Safety guards

Send coupon for free booklet.

®Masonite Corporation—manufacturer of quality panel products.

MASONITE® PRODUCTS

MASONITE CORPORATION
Dept. PE-3, Box 777, Chicago 90, Ill.

Please send me your free booklet on factory methods and Masonite panels.

Name.....

Firm.....

Address.....

City.....*State*.....

Zone.....*County*.....

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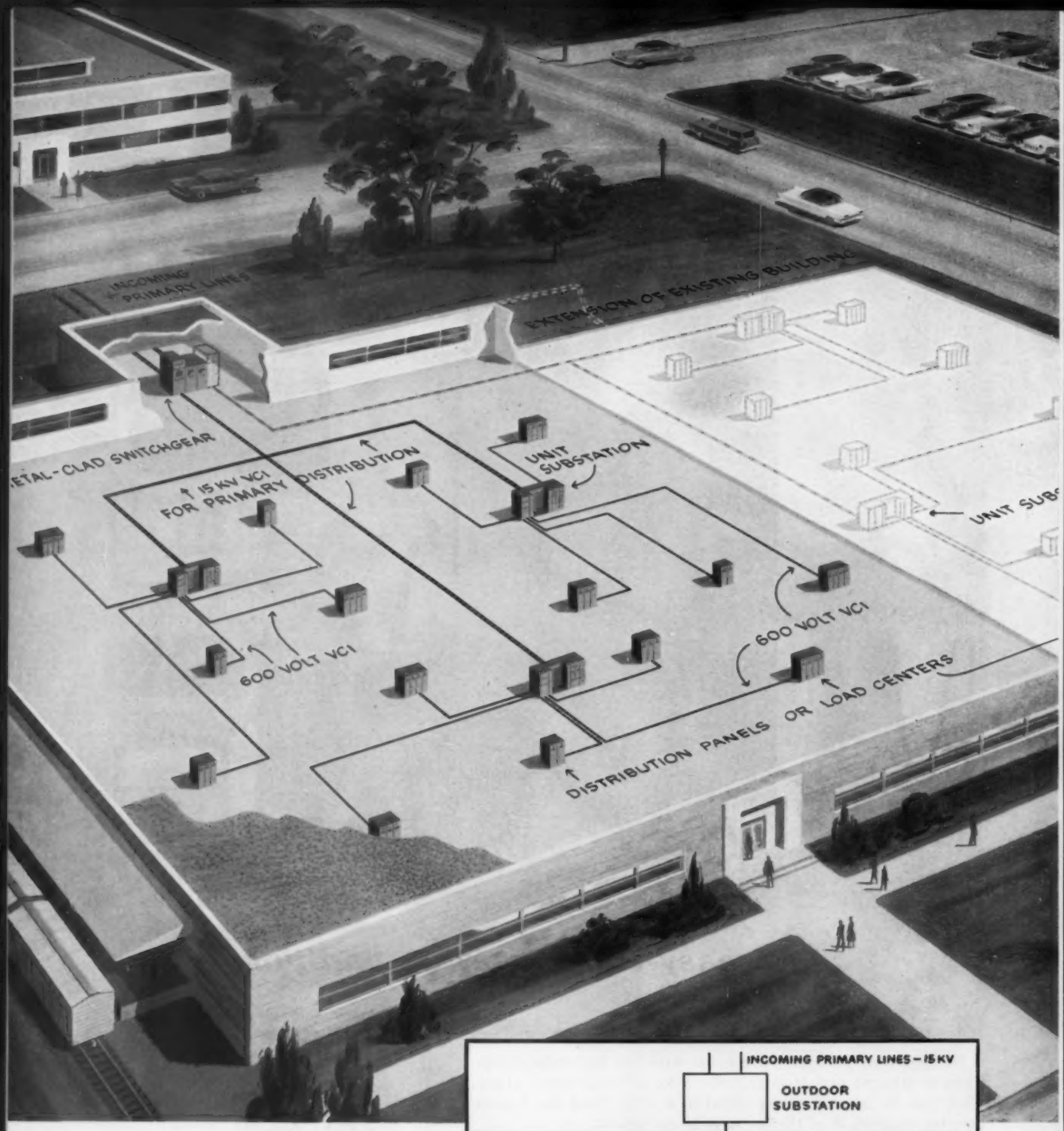
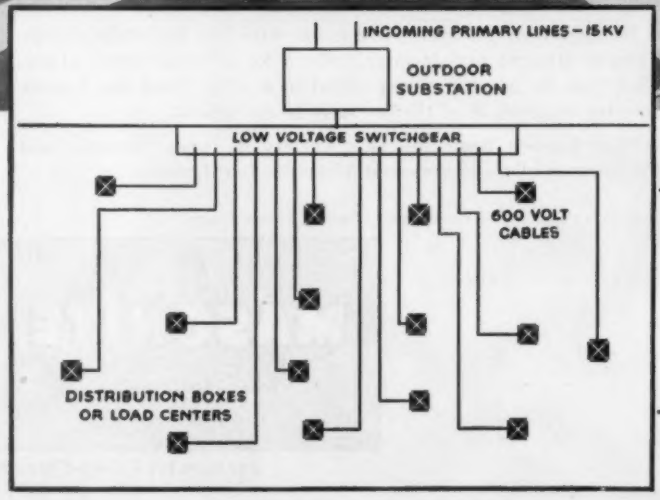
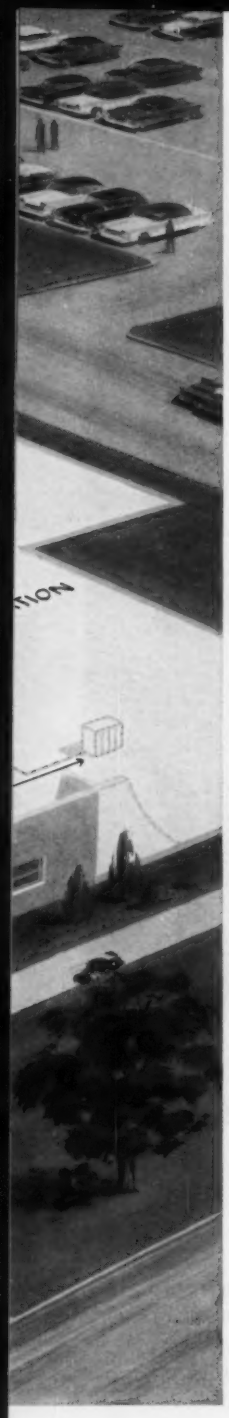


NEW G-E INTERLOCKED ARMOR CABLE SYSTEM reduces voltage drop, costs less to install and maintain, provides for system expansion or relocation (indicated by dotted line area).

OLD-TYPE LOW-VOLTAGE FEEDER SYSTEM has cables in long runs, excessive power losses, and high maintenance costs.





GENERAL ELECTRIC INTERLOCKED ARMOR CABLE provides system flexibility now, expansibility as needed

Individual feeders can be added or re-routed to serve new load areas without major modifications

In new plants, and in plants modernizing their present power handling systems, General Electric interlocked armor cable provides many compelling advantages: reduced cost of materials, lower material handling costs, less installation time, a minimum of layout time—all of which mean a lower total installed cost when compared with a cable-in-conduit installation. (See charts below.)

EASE OF INSTALLATION—This highly flexible, interlocked cable goes in fast—indoors and out, around corners, over beams in long, unbroken runs. The cable is pulled through on low-cost racks, in baskets, on troughs, or on messengers. And, where splicing is necessary, a simple mechanical joint does the job quickly and easily.

EXPANSIBILITY—When you use a General Electric interlocked armor cable system to meet your present needs for more efficient handling of power and reduced voltage drop, you also plan and provide for your future requirements. For this General Electric engineered system provides an open end for growth where additional feeders can be added or where present installations can be moved to new load areas without major modifications.

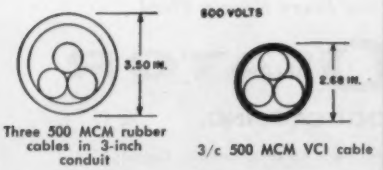
TYPES OF CABLE—Three types of General Electric interlocked armor cable cover most applications: for dry locations, and general purpose duty—varnished-cambric interlocked armor cable is the most economical; for interior or exterior locations, above grade or in moist atmospheres—this VCI cable is available with a special protective polyvinyl chloride jacket; and, for both wet and dry locations—Super Coronol* Geoprene* interlocked armor cable eliminates the need for time-consuming potheads and can be run through underground ducts.

Other types of interlocked armor cables are also available with thermoplastic, silicone rubber, and asbestos insulations—with galvanized steel, aluminum, and bronze armor, with or without polyvinyl chloride coating over the armor. *For your copy of the new booklet, "G-E Interlocked Armor Cable," write Section W182-367, Wire and Cable Department, General Electric Co., Bridgeport 2, Conn.*

*Registered Trade-mark General Electric Company

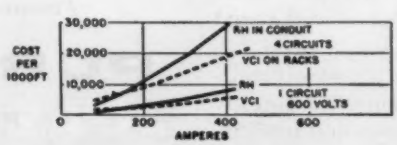
Progress Is Our Most Important Product

GENERAL ELECTRIC



Three 500 MCM rubber cables in 3-inch conduit

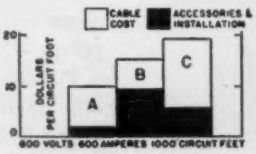
3/c 500 MCM VCI cable



A. Two 3/c 350 MCM VCI cables in parallel.

B. Two 1/c 350 MCM cables per phase, in conduit.

C. Bus.



LESS SPACE IS NEEDED Almost 1 inch less space is needed for each 3/c 500 MCM interlocked cable than for cable-in-conduit type installation.

LOWER MATERIAL COST Graph shows $10,000 material saving on 30,000-foot installation. This means more footage for less money.

REDUCED INSTALLED COSTS Chart compares the lower cost of G-E VCI system vs. cable-in-conduit and bus systems.

For more facts circle 571 on Reply Card

You can't do a quality job ...unless your coolant is clean

Abrasive dust in a machine tool's coolant seriously interferes with quality work and puts added wear on the coolant pump. Dirty coolants are particularly harmful in precision work. The only sure protection is effective filtration. It's also far more economical than repeatedly cleaning your equipment, and replacing the coolant. The finest filter available for this job is the Purolator Micronic® filter. Purolator's Micronic filters assure full protection for all kinds of work – and pumps – as no other filter does.

Purolator's Micronic element is made of plastic-impregnated cellulose. Its controlled porosity evenly filters out fine submicronic dust particles. It can't possibly channel, and it's in no way affected by high temperature, oil, or water.

Find out how Purolator Micronic filters can help you improve precision and cut down wear and tear on equipment by keeping coolants clean. Write for new Industrial Catalog to Purolator Products Inc., 970 Brunswick Ave., Rahway, N. J. Dept. P3-34.

Filtration For Every Known Fluid

PUROLATOR

PRODUCTS, INC.

Rahway, New Jersey and Toronto, Ontario, Canada

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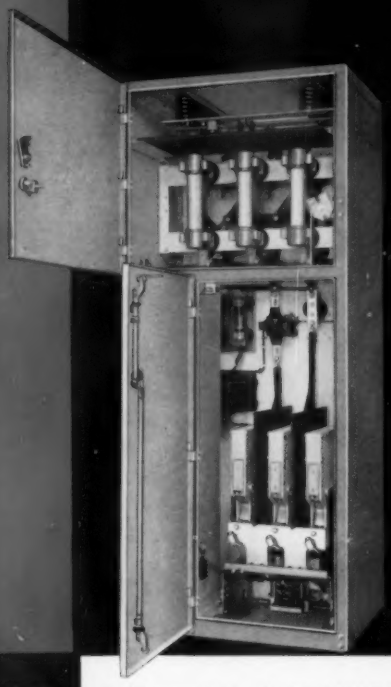
For more facts circle 573 on Reply Card ——→

a complete line—



Bulletin 709—LOW VOLTAGE
Eight sizes. Max ratings: 300 hp, 220 v; 600 hp, 440-550 v.

Bulletin 1159—HIGH VOLTAGE
Two sizes. Max ratings: 1500 hp, 2300 v; 2500 hp, 4600 v.

# of across-the-line Solenoid Starters

About 25 years ago, Allen-Bradley introduced the first modern *solenoid* starter . . . a revolutionary new design. Because of its simple construction and the resultant greater reliability, this starter became the model for the industry. Other manufacturers brought out solenoid starters in the lower ratings, but—only Allen-Bradley offers a full line of *eight* sizes. Like their smaller brothers, the higher rated starters provide an extremely long life and unfailing reliability.

Recently, Allen-Bradley announced a new line of high voltage starters—5000 volts, max—using the same reliable solenoid construction principles. These new air break starters have a mechanical life of millions of operations. Try them on your toughest high voltage applications and let yourself be surprised. Write for bulletin.

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada—Allen-Bradley Canada Ltd., Galt, Ont.

all have *DESIGN SIMPLICITY* for trouble free operation

- Only one moving part. No pins, pivots, or flexible jumpers.
- Double break, silver alloy contacts need no maintenance.
- Compact switch mechanism provides plenty of wiring space.
- Reliable overload relays protect the motor at all times.

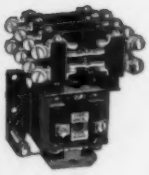
ALLEN-BRADLEY
MOTOR CONTROL
QUALITY

A-B Quality

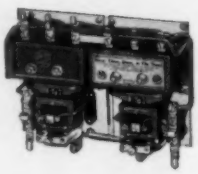
3-57-M

"we'll use ALLEN-BRADLEY Quality Motor Control ...it's trouble free!"

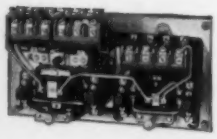
SPECIFY THESE RELIABLE MOTOR CONTROL UNITS



Bulletin 700
Universal Relay with
N.O.—N.C. Contacts



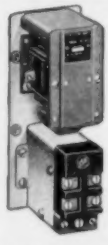
Bulletin 705 Size 2
Reversing Starter



Bulletin 715 Two
Speed Consequent
Pole Starter

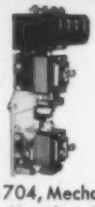
Bulletin 802T Adjustable
Lever Oiltight Limit
Switch

Bulletin 702 Three Pole
Size 2 Contactor



Bulletin 849 "On-Delay"
Pneumatic Timer

Bulletin 892
Handy Terminal
Blocks

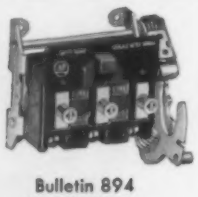


Bulletin 704, Mechanically
Held, Hum-free Relay

Bulletin 200
D-C Relay

Bulletin 350
Reversing Drum Switch

Bulletin 836
Pressure Control in
NEMA Type 4 Enclosure



Bulletin 894
Visible Blade
Disconnect Switch

Bulletin 709
Size 4 Automatic
Starter

Bulletin 609
Three Phase
Manual Starter

Oiltight Push Button, Selector Switch, Press-to-Test
Pilot Light, and completely assembled Oiltight Station

Allen-Bradley *quality* components assure you millions of trouble free operations. The simple design, maintenance free, double break, silver alloy contacts, and rugged design features have made them the first choice among design engineers, contractors, and maintenance men. You just can't go wrong with this QUALITY line.

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada—Allen-Bradley Canada Ltd., Galt, Ont.

Send for your copy of the new 7th edition of the Allen-Bradley Handy Catalog

3-57-MR

GUESS WHO DIDN'T SPECIFY MONARCH INDUSTRIAL SOLID TIRES

Have another bite, Dimbulb! You said you'd "eat" this tire if it didn't outlast a MONARCH!

Have a heart, boss! That was only a figure of speech!

G'wan...eat! That "figure of speech" cost us plenty! We've replaced too many solid tires lately!

But I thought all solid tires were the same!

Dimbulb, we need results...not excuses and high replacement costs! We can't afford premature tire failures. That's why I told you to get MONARCH solids. They last longer!

Then they must cost more! How do we save if we have to pay a premium?

There's no premium for MONARCH tires! They cost no more than other brands. But...they do give more mileage per dollar because they are made by specialists and modern equipment from the finest raw materials available. Users' records as well as fatigue tests prove they are best!

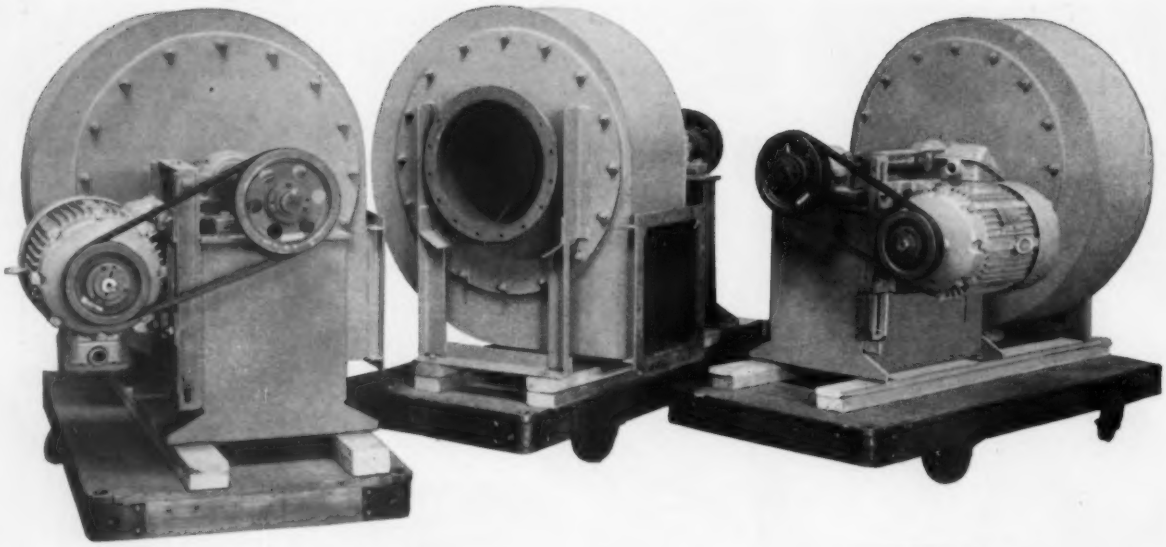
I'll buy that! And I'll call the local MONARCH dealer today for prices.

Why don't you check the Yellow Pages for your nearest Monarch dealer? Ask him, or write direct, for our new 16-page CATALOG MR-457. It's full of facts, specifications and suggestions to help you save more on solid tires.

THE MONARCH RUBBER COMPANY
453 LINCOLN PARK • HARTVILLE, OHIO
• 7-255 General Motors Bldg., Detroit, Mich.
• 1035 Bartlett Street, Hayward, Calif.

T316-MR

For more facts circle 574 on Reply Card



EXHAUSTING CORROSIVE FUMES

no problem for Clarage rubber-lined fans

Clarage's distinctively heavy-duty construction, plus the added advantage of special coatings, add up to far longer service life. Important savings for you!

The Clarage fans above are now serving as leach tank exhausters, handling fumes from a concentrated brine solution containing up to 5% hydrochloric acid. In this case, all interior fan parts are protected by a layer of rubber vulcanized to the metal. For other extra-severe applications Clarage fans can be treated with other special coatings, lead lined, or built of special construction.

If you're seeking fans that have what it takes — in every respect — call us in. CLARAGE FAN CO., Kalamazoo, Michigan.

Send for Bulletin 702-A

CLARAGE

... dependable equipment for making air your servant

SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES • IN CANADA: Canada Fans, Ltd., 4285 Richelieu St., Montreal

For more facts circle 575 on Reply Card

"We should've had this stuff on the ramp years ago."

Flooring of ramp is A.W. ALGRIP—world's only abrasive rolled steel floor plate—and today's safety record tells the ALGRIP story.

ALGRIP provides super-safe footing under the *most hazardous* slipping conditions—on flat or *inclined* surfaces. It's made by a patented process in which a grinding-wheel type abrasive is rolled—*not coated*—to a controlled depth as an integral part of tough steel plate. Usage merely exposes more non-slip abrasive surface.

To eliminate accidents on ramps, loading docks and wherever slipping hazards exist in your plant, specify A.W. ALGRIP. Make a test installation. Use ALGRIP as an overlay or as independent flooring. It fabricates easily, requires no maintenance and will soon pay for itself in reduced accident and insurance rates.

ALGRIP ABRASIVE ROLLED STEEL FLOOR PLATE

ALGRIP—*approved for safety by Underwriters' Laboratories*

ALAN WOOD STEEL COMPANY
Conshohocken, Pa.

Please send A.W. ALGRIP Booklet AL-S29

Name_____

Title_____

Company_____

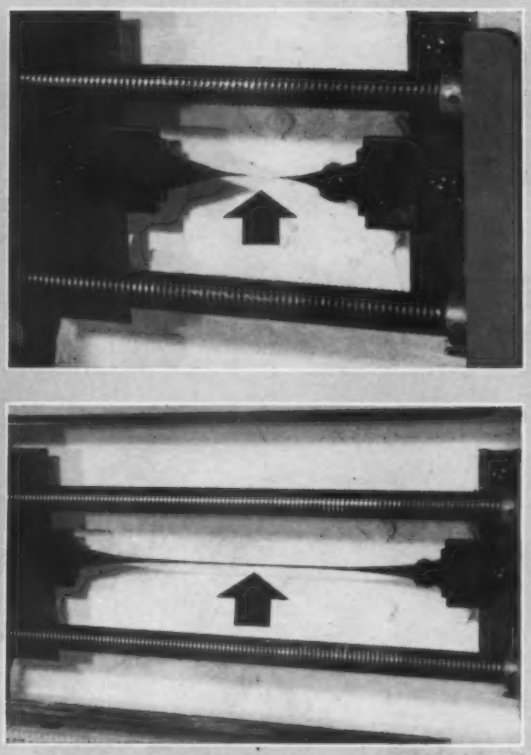
Address_____

City_____ Zone_____ State_____

OTHER PRODUCTS:
A.W. SUPER-DIAMOND rolled steel floor plate—Plates—Hot and cold rolled sheet and strip—(Alloy and Special Grades)

For more facts circle 576 on Reply Card

Johns-Manville *Aquadam*® Built-Up Roofs— proved superior by actual tests!



Here's conclusive proof of Aquadam's greater resistance to cracking!

TOP—A typical asphalt is shown at average breaking point of 12 CM.

BOTTOM—This is Aquadam at a 25 CM stretch—100% beyond average—won't break even when stretched to 110 CM.

AQUADAM BUILT-UP ROOFS owe their proven superiority to Aquadam, the special bituminous cementing agent, used in the application of the roofing felts. Aquadam is an exclusive Johns-Manville development.

When applied, Aquadam's excellent adhesive properties create a permanent bond to the felts and to the slag or gravel surfacing. Aquadam's rigidly controlled quality and excellent flow properties assure easier mopping, thorough coverage, longer roof life.

Johns-Manville Aquadam Roofs are specially designed to provide maximum built-up roof service for deck inclines from dead level to ½" per foot. Available in both a smooth-surfaced and a slag or gravel specification.

Your local Approved J-M Contractor is listed in the Yellow Pages of your telephone directory. He will gladly give you complete information about J-M Aquadam Built-Up Roofs. Or, write Johns-Manville, Box 158, New York 16, N. Y. In Canada: 565 Lakeshore Rd. E., Port Credit, Ont.

JOHNS-MANVILLE JM PRODUCTS

CHECK THESE 7 IMPORTANT AQUADAM ADVANTAGES:

- ✓ Outstanding resistance to cracking
- ✓ Improved self-healing properties
- ✓ Superior weather resistance
- ✓ Greater kettle stability
- ✓ Exceptional adhesion, stronger bond
- ✓ Greater resistance to water
- ✓ Excellent uniformity

Johns-Manville

For more facts circle 577 on Reply Card

ROCKWELL-BUILT

NEW DELTA 15" drill press

...replaces expensive special tooling

The new Delta 15" combines the ruggedness, power and precision of much heavier machines with unmatched power tool versatility. Here's how it can save you money on a wide range of jobs:

DOES MORE WORK MORE ACCURATELY—*Only* Delta offers a selection of *six* spindle adaptors for all production drilling operations—eliminates the need for costly single-purpose machines on many jobs. And each adaptor is mounted on a ground taper for *complete* accuracy, features a threaded collar for *positive* locking.

BIG MACHINE RUGGEDNESS—Delta's unmatched power tool know-how gives you extra rugged design and construction—massive one-piece head, big 2" dia. quill, oversized heavy duty ball bearings—that adds up to years of dependable, low cost operation even under heaviest everyday work loads.

EASY, CONVENIENT OPERATION—*Exclusive "universal" hand feed* combines the best features of pilot wheel and single lever feeds for adjustable leverage, freedom from striking table or fixtures, almost infinite choice of feed lever positions.

Counterbalanced belt guard completely encloses belt and pulleys, swings up for fast, safe speed changes. You get these and many more time and work-saving advantages found in no other 15" drill press!

SEE THE ENTIRE DELTA DRILL PRESS LINE—Get all the facts about the new Delta 15" and other new and improved Delta Drill Presses. Compare—then make up your *own* mind! Your Delta Dealer is listed under "TOOLS" in the Yellow Pages of your phone book.

Send coupon for all the facts!

another product by **ROCKWELL**

Delta Power Tool Div., Rockwell Manufacturing Co.
602C N. Lexington Ave., Pittsburgh 8, Pa.

- ☐ Please send catalog on entire Delta Drill Press line.
- ☐ Please send booklet: Delta Power Tools Teamed with Machine Tools.
- ☐ Please send names of my nearest Delta Dealers.

Name_____ Title_____

Company_____

Address_____

City_____ County_____ State_____

For more facts circle 578 on Reply Card

"We've reduced our scrubbing time from 70 to 7 man-hours ... and our floors have never before been so clean!"

— says Foreman of
BURNY BROS. BAKERY, CHICAGO

Garage and stockroom floors in Burny Bros. large, modern bakery get daily scrubbing with a *Job-Fitted Combination Scrubber-Vac* and *Setol Cleanser*

THEY'RE an unbeatable team to speed the cleaning of oily, greasy floors. *Here's why:* A *Scrubber-Vac* completely mechanizes scrubbing. It applies the cleanser, scrubs, flushes if required, and picks up (damp-dries the floor) — *all in one operation! Job-fitted* to specific needs, a *Scrubber-Vac* provides the maximum brush coverage consistent with the area and arrangement of the floors. Its teammate, *Setol Cleanser,* is specially designed for the greater speed of *combination-machine-scrubbing* ... emulsifies grimy oil and grease *instantaneously* for fast, thorough removal by the machine's powerful vac. Moreover, *Setol* retains its strength longer than average alkaline cleansers. This, too, speeds the cleaning process ... saves on materials ... and cuts operating time of the machine, which in turn reduces labor costs. The *Scrubber-Vac* shown above is *Finnell's 213P,* for heavy duty scrubbing of large-area floors. It's *self-propelled,* and has a 26-inch brush spread. Cleans up to 8,750 sq. ft. per hour (and more in some cases), depending upon condition of the floors, congestion, et cetera. (The machine can be leased or purchased.) *Finnell* makes a full range of sizes, and *self-powered* as well as *electric* models ... also a full line of fast-acting cleansers. In fact, *Finnell makes everything for floor care!* Find out what *you* would save with *combination-machine-scrubbing.* For demonstration, consultation, or literature, phone or write nearest *Finnell Branch* or Finnell System, Inc., 5303 East Street, Elkhart, Indiana. Branch Offices in all principal cities of the United States and Canada.

FINNELL SYSTEM, INC.
Originators of Power Scrubbing and Polishing Machines

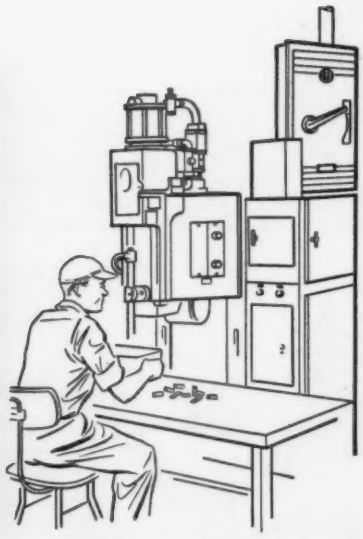
Everything FINNELL for Floor Care

BRANCHES IN ALL PRINCIPAL CITIES

For more facts circle 579 on Reply Card

MOLDED CASE CIRCUIT BREAKERS

Magnetic only type ETI circuit breakers are available in F, J, K, KL, L and M frames (3 to 800 amperes continuous ratings), 2 or 3 pole, 600 v a-c, 250 v d-c.



Typical resistance welder application of *magnetic only* type ETI circuit breakers in an individual enclosure.

Selective Short Circuit Protection for Motors and Resistance Welders

External instantaneous trip adjustment.

In motor control and resistance welding applications, adjustment of protective devices to a required setting is important. One of the many features of the ETI circuit breaker is its convenient externally adjustable magnetic trip device. When it is required to adjust the trip to a finer degree, adjustment is made from the front of the breaker without interrupting service or encountering live conductors. The range of instantaneous trip adjustment means greater protection for motors and resistance welders. When a short circuit occurs, all poles open simultaneously. And enclosed terminals protect personnel, yet permit easy cable connections. All these extra values in I-T-E Molded Case Circuit Breakers are yours at no extra cost. Send for complete information or contact your nearest I-T-E authorized distributor.

Typical motor control application of *magnetic only* type ETI circuit breakers.

Molded Case Circuit Breakers...added value at no extra cost

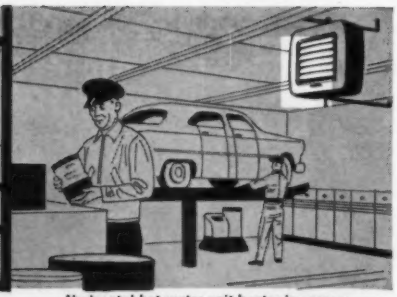
I-T-E CIRCUIT BREAKER COMPANY Small Air Circuit Breaker Division

19th & Hamilton Sts., Philadelphia 30, Pa.

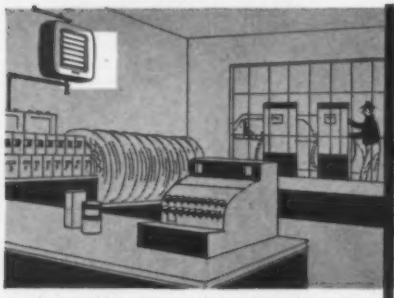
For more facts circle 580 on Reply Card

Vertical steam unit heater in factory

Horizontal gas unit heater in store

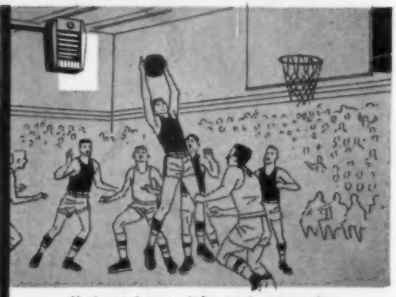


Horizontal hot water unit heater in garage



Horizontal hot water unit heater in service station

Horizontal steam unit heater in warehouse



Horizontal gas unit heater in gymnasium

why so many users of unit heaters say

make mine Modine

Satisfied users continue to insist on Modines. They like the high level of comfort Modines squeeze out of every fuel dollar. And they approve of the attractive appearance, the safety, the silent operation . . . the little care Modines require.

FOR STEAM AND HOT WATER

Modine horizontal delivery models are built in blow-through and draw-through types, in 36 different capacities. Direct-from-pipe suspension hook-up many times saves up to $20 on each Modine unit.

Modine vertical delivery models are offered in 26 different capacities, each with a choice of 4 types of air deflectors.

Write for free Bulletin 155.

GAS-FIRED

Modine horizontal delivery gas-fired models are offered in 8 AGA-approved sizes — 25,000 to 310,000 Btu. Choice of stainless or aluminized steel heat exchanger with stainless steel burner. Units are up to 50% lighter than other makes for lower shipping and installation costs. Modine port design provides four times the free area of conventional drilled ports.

Write for free Bulletin 656.

NOTE: Modine offers a specially built line of premium HCR models for use where internal corrosion is a problem.

For further facts, see the Modine representative listed in the classified section of the phone book, or write Modine Manufacturing Co., 1563 DeKoven Ave., Racine, Wisconsin.

Steam and hot water unit heaters

Gas-fired unit heaters

Modine UNIT HEATERS

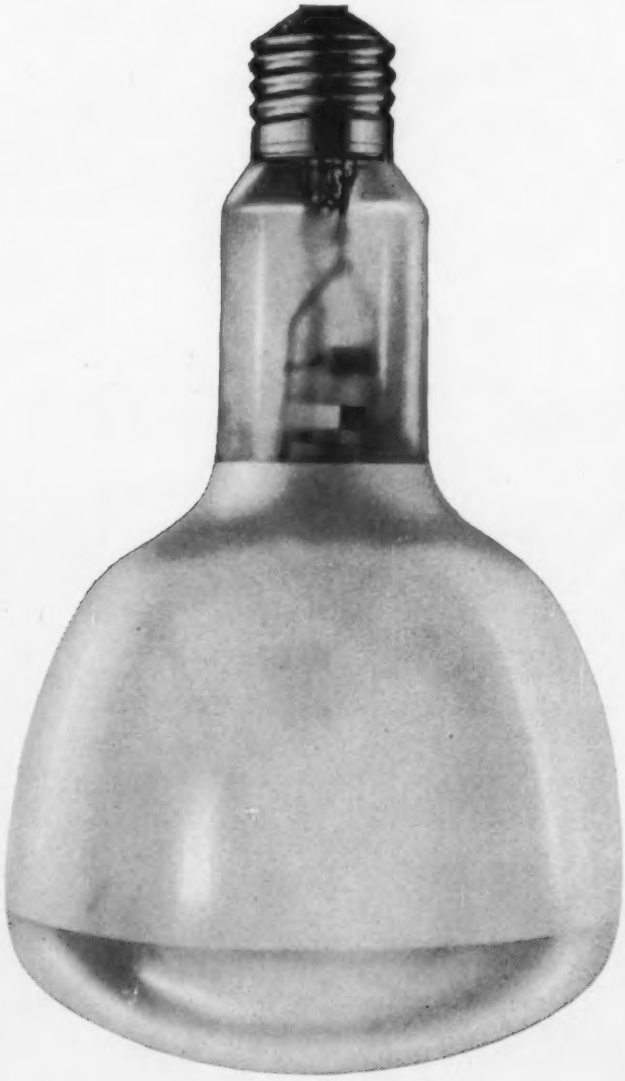
In Canada: Sarco, Ltd., Toronto

U-1324

For more facts circle 581 on Reply Card

Switch to this new General Electric

WHITE MERCURY LAMP



YOU can use the new General Electric *White Mercury* Reflector Lamps *in your present 400-watt mercury equipment* with no change or added investment in operating equipment.

1 GET UP TO 63% MORE LIGHT ON WORK FROM YOUR PRESENT FIXTURES: Because a brand new phosphor generates more white light than ever before you get from 7% to 63% more light on the work, depending upon the lamp type you are replacing. (See below).

2 GET UP TO 33% LOWER COST OF LIGHT IN YOUR EXISTING INSTALLATIONS: With this increased efficiency your unit cost of light can go down from 7% to 33%. (See below)!

3 GET LOWER INITIAL COST FOR NEW INSTALLATIONS: You can get *more* light from the same number of fixtures, or get *equal* light with up to ⅓ *fewer* fixtures!

You get all this with new General Electric *White Mercury* Reflector Lamps because of a specially designed strontium magnesium orthophosphate phosphor. This phosphor converts ultra-violet radiation into more white light than ever possible before. It's also an efficient reflector—sealed in against dirt and fumes.

Gain these advantages *now*. Replace your present mercury lamps with the new G-E H400 RW-1. Also available in the bulged tubular shape, the H400 EW-1. For more information write: General Electric Large Lamp Dept. PE-3, Nela Park, Cleveland 12, Ohio.

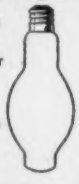
ADVANTAGES OF NEW G-E *WHITE MERCURY* OVER OTHER G-E 400-WATT MERCURY LAMPS

NEW RW-1 vs A-1 (clear glass)

- 55% to 63% more light to the work
- 27% to 33% lower cost of light
- Less maintenance
- Whiter "Color"

NEW RW-1 vs E-1 (clear glass)

- 28% to 31% more light to the work
- 16% to 23% lower cost of light
- Less maintenance
- Well suited for use in upward light fixtures
- Whiter "Color"

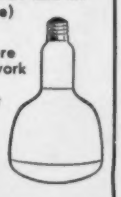


NEW RW-1 vs J1 (color improved)

- 37% to 40% more light on the work
- 24% to 30% lower cost of light
- Less color improvement

NEW RW-1 vs RC1 and R1 (reflector shape)

- About 7% more light on the work
- 7% lower cost of light
- Less color improvement for RC-1 users



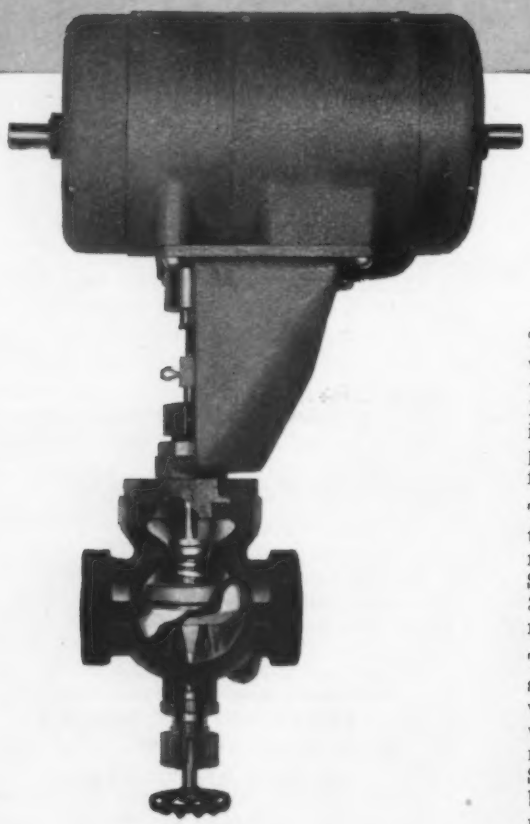
Progress Is Our Most Important Product

GENERAL ELECTRIC

For more facts circle 582 on Reply Card

NEW ACTIONATOR*

heavy duty electric motor for operating valves, dampers, louvers



The new Honeywell ACTIONATOR* is a compact, lightweight, rugged and flexible industrial motor for operating valves, dampers, louvers, and other final control elements. Models for boss mounting or with integral valve yoke for installation on slip stem valves. Internal strain release protects valve seats and gear train. Squared shaft ends facilitate actuating lever attachment.

The ACTIONATOR is available in reversing or unidirectional models for on-off or two-position control, and in reversing models for floating or proportional control. Shaft rotation can cover up to 350 degrees in 7½, 10, 15, 30, 60, or 120 second timings, depending on model; torque ratings to 200 pound-inches, depending on motor speed.

The proportional control model provides slidewire resistances of 135, 500 and 1000 ohms, and can be used with any type of proportional controller. A second slidewire can be used for retransmission, to operate another motor, or for remote indication. If preferred, SPST and SPDT auxiliary switches can be installed within the end bells. The enclosed terminal compartment is designed to meet J.I.C. standards.

Specially designed MICRO SWITCH switches allow the ACTIONATOR to be used where ambient temperatures range from 25 to 150 F.

For complete information and specifications on the new ACTIONATOR, call the nearest Honeywell office, or write (send coupon) to:

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Phila. 44, Pa.

Industrial Division
MINNEAPOLIS-HONEYWELL REGULATOR CO.
Wayne and Windrim Avenues, Philadelphia 44, Pa.

☐ Please send me additional information on the ACTIONATOR.

☐ I'd like a Honeywell sales engineer to discuss applications of the ACTIONATOR in my plant.

Name_____

Title_____

Company_____

Address_____

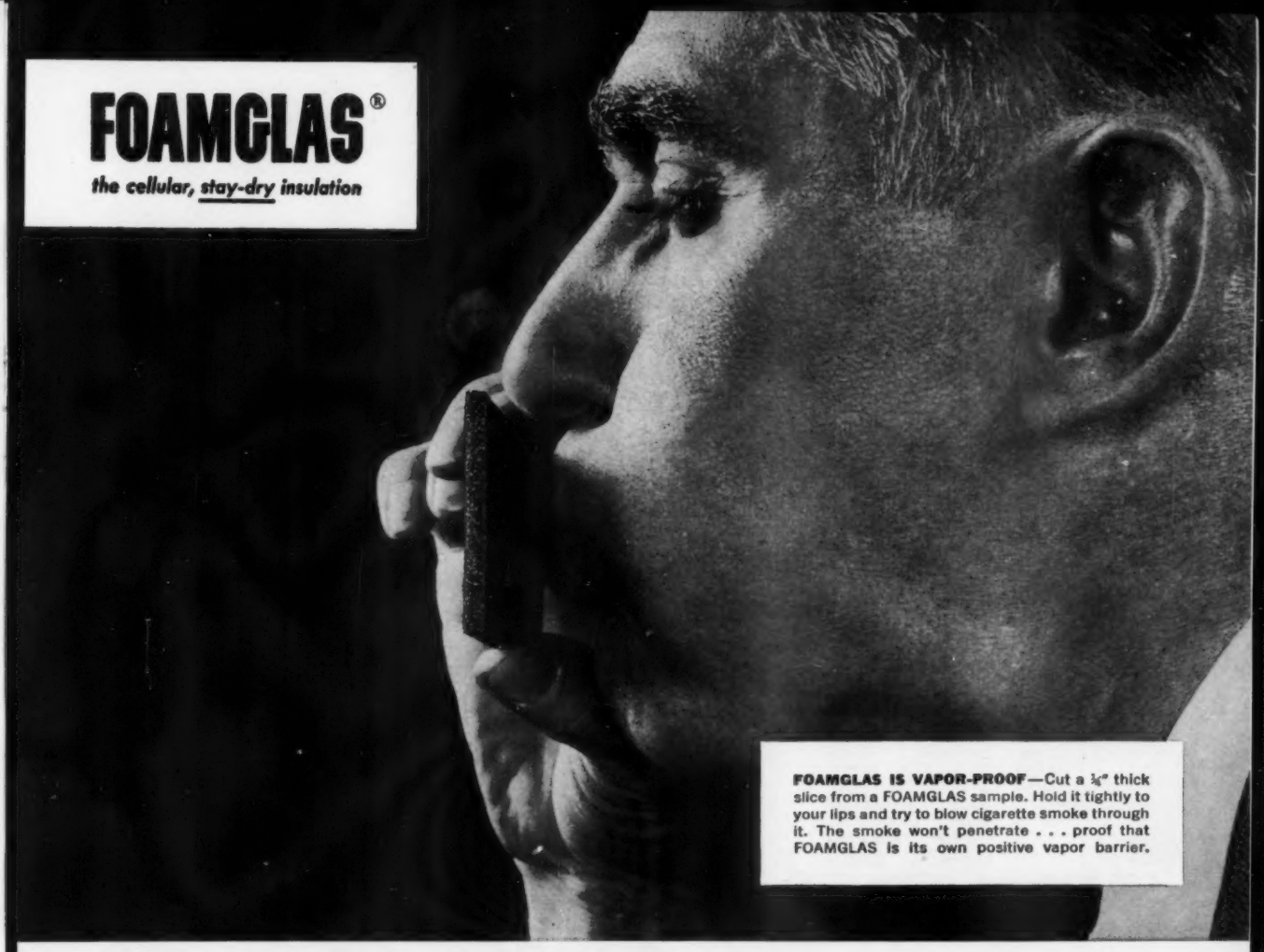
MINNEAPOLIS **Honeywell**

First in Controls

*Tradename Minneapolis-Honeywell Regulator Co.

FOAMGLAS®

the cellular, stay-dry insulation



FOAMGLAS IS VAPOR-PROOF—Cut a ¼" thick slice from a FOAMGLAS sample. Hold it tightly to your lips and try to blow cigarette smoke through it. The smoke won't penetrate . . . proof that FOAMGLAS is its own positive vapor barrier.

Vapor can ruin ordinary insulations . . .

Prove to yourself that FOAMGLAS is vapor-proof!

Send for a sample and test it!

Nature exerts almost constant pressure to force heat and moisture vapor through a thermal insulation. Permeable insulations absorb that vapor. Even expensive vapor barriers cannot always insure absolute protection.

Once vapor enters an insulation —and condenses there—insulating value starts to nosedive . . . because moisture conducts heat. The *real* cost of a permeable insulation may multiply two or three times . . . in terms of lost insulating value and the resulting increase in heating and cooling costs.

That's why it pays to specify FOAMGLAS for true insulating economy. This unique all-glass insulation is naturally immune to vapor attack. Composed of millions of sealed cells, each a separate insulating unit, FOAMGLAS repels moisture in any form . . . liquid or vapor. Its insulating efficiency can never vary, and no costly vapor barrier is needed to protect it. Prove it to yourself with the simple test illustrated above.

In a few minutes, in your own office, you can test the whole combination of properties that makes FOAMGLAS unique among insulating materials. These properties have been proved not only by rigid scientific tests, but by hundreds of actual insulating applications. Send for a free sample and complete testing directions today. Address:

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Pittsburgh 22, Pennsylvania
In Canada: 57 Bloor St. W., Toronto, Ont.

FOAMGLAS is waterproof . . . strong and rigid . . . inorganic and incombustible . . . lightweight

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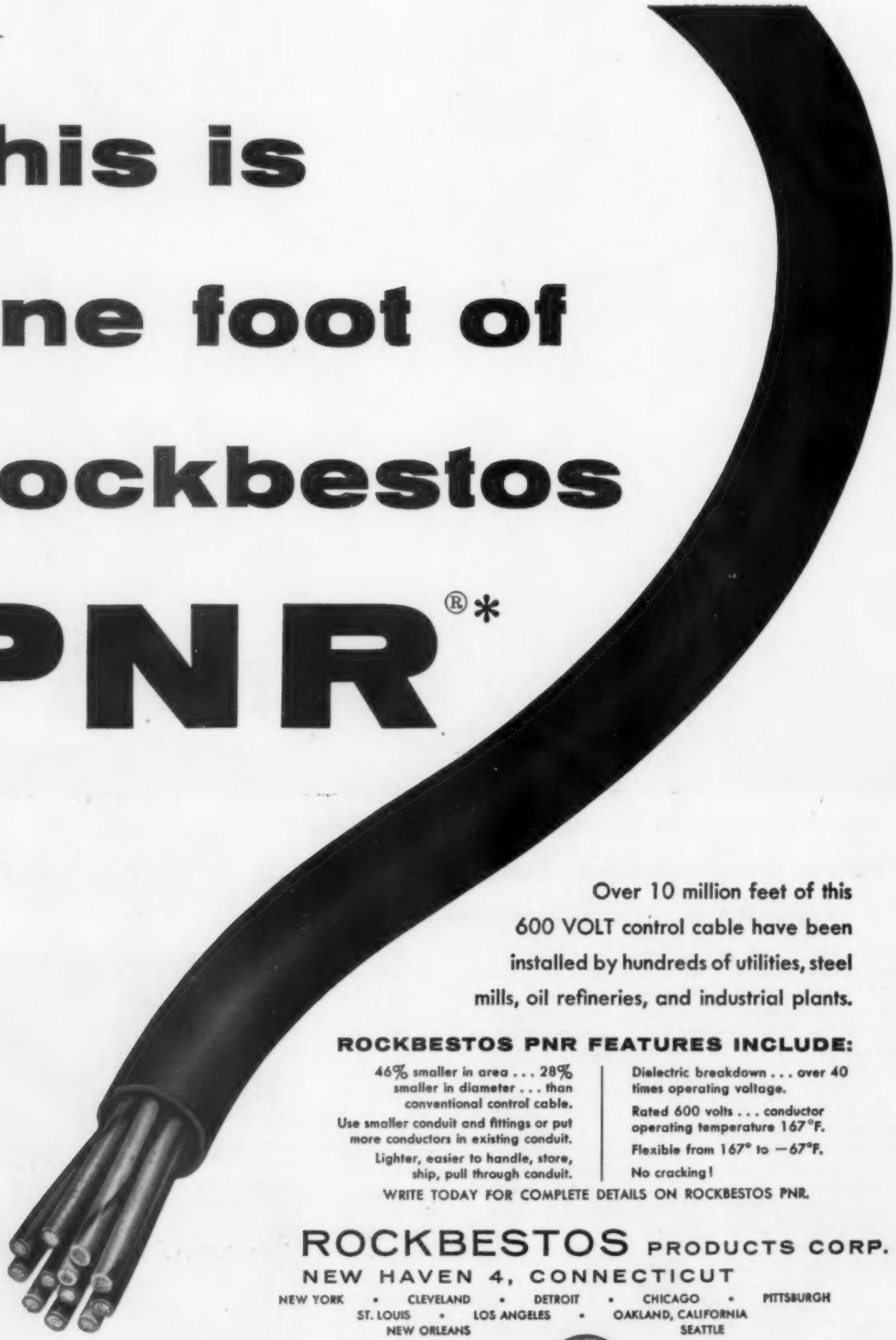
This is One foot of Rockbestos PNR®*



Over 10 million feet of this 600 VOLT control cable have been installed by hundreds of utilities, steel mills, oil refineries, and industrial plants.

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- Use smaller conduit and fittings or put more conductors in existing conduit.
- Lighter, easier to handle, store, ship, pull through conduit.
- Dielectric breakdown . . . over 40 times operating voltage.
- Rated 600 volts . . . conductor operating temperature 167°F.
- Flexible from 167° to −67°F.
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*P — polyethylene, N — nylon, R — Rockhide (PVC)

For more facts circle 585 on Reply Card

VU Boilers exceed performance guarantees

at Central Fibre Products Co.

The two C-E Vertical Unit Boilers installed in this plant have exceeded their guaranteed efficiency of 82.6% and guaranteed peak capacity of 100,000 lb steam per hr. These stoker-fired units are equipped with a C-E overfire air system that *works to perfection* by completely burning out all combustibles at the proper point, allowing for a *very clean furnace.* There is *absolutely no smoke* from the stacks. Furthermore, the draft loss of each unit – as well as the flue gas temperature leaving the economizer – is lower than the customer expected.

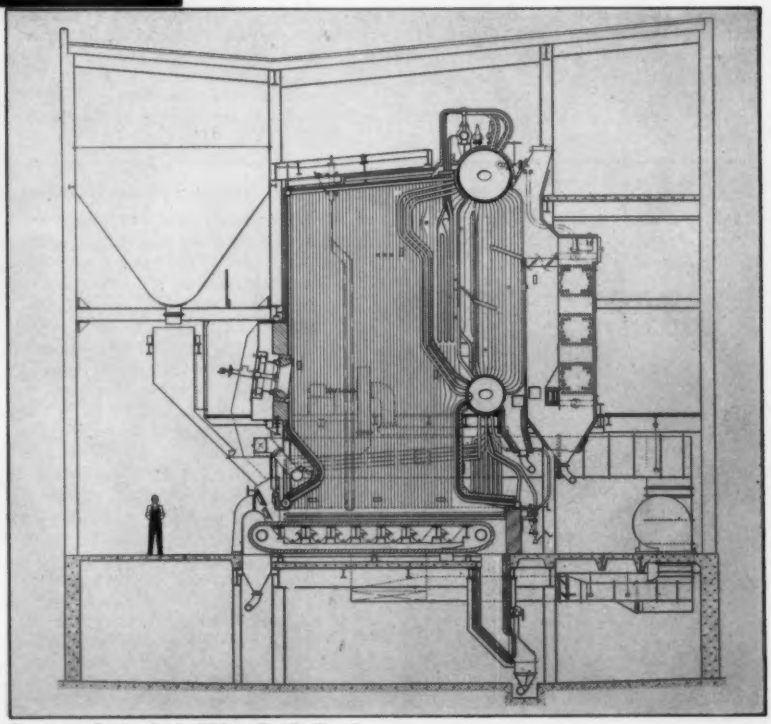
The above comments are all contained in a report written by the H. M. Wilson Company, Inc., Consulting Engineers to the Central Fibre Products Company, of Quincy, Illinois. Of course, it won't hurt to get the opinion of the customer, too, if you're interested. They will be very happy to discuss their boiler installation with you.

Incidentally, when you need boilers, consider the fact that Combustion has a complete line of steam generating and fuel burning equipment suitable for any pressure, temperature and fuel requirement.

Below: Cross-sectional elevation of the C-E Vertical Unit Boiler, Type VU-50X, installed in the Mill Division Plant of the Central Fibre Products Company, Quincy, Illinois. There are two units, each fired with a C-E Traveling Grate Stoker and designed for the future use of oil or gas as alternate fuels.

Present operating conditions are 185 psi and 450 F. Each unit has a maximum continuous capacity of 85,000 lb per hr and a four hour peak of 100,000 lb per hr. The boilers are designed for 650 psig and in the future will operate at 610 psig and 650 F.

Firing aisle at the Central Fibre Products Mill Division plant at Quincy, Ill. This is a front end view of two C-E Traveling Grate Stokers which fire the VU Boilers as shown by the cross-sectional elevation drawing.



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all types of steam generating, fuel burning and related equipment; nuclear reactors; paper mill equipment; pulverizers; flash drying systems; pressure vessels; soil pipe. B-967A

For more facts circle 586 on Reply Card

NEW PRODUCTS AND PROCESSES summarized for your convenience

Edited by M. E. Heniken

1—MULTI-USE GREASE is lithium based product

Gulfcrown Grease is designed to provide superior lubrication under conditions which often require a variety of special greases—high and low temperatures, action of water, high-speed bearing action, and long storage. Four features are claimed for this lubricant. First of these is high oxidation stability to provide longer life both in use and in storage. Other advantages cited include high mechanical stability to keep grease from thinning and running out of bearings; high resistance to washing action of water to provide continued lubrication under damp conditions and effective protection against rust; and ready flow in cold weather. Gulfcrown Grease comes in four consistencies and can be applied by guns or centralized system. Gulf Oil Corp.

2—COOLING COMPOUND for cutting aluminum

Aluminum can be machined or ground without stain or discoloration, it is announced, by using this straight oil compound, Compound 1231-A. It is said to possess excellent lubricating properties which protect both the work and moving parts of machine. According to manufacturer, this coolant penetrates to the point of contact swiftly and prevents premature loading of grinding dust on the wheel. This same anti-welding action serves to increase life of cutting tools by virtually eliminating welding of chips or "bugs" on the tool. Chips are drained off continually. The compound is described as a special blend of mineral oils and synthetics that will not become rancid. International Chemical Co.

More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 257-258.

4—ANTI-SLIP COATING promotes floor safety

Ferrox, a non-skid plastic abrasive composition, provides low-cost coverage, 40 ft to the gallon, says manufacturer, and costs about a third as much as fabric-backed floor coverings. It goes down fast—you simply trowel it on. According to company, Ferrox assures a non-slip grip and resists oil, chemicals and weather conditions. It is suggested for concrete floors in washrooms, ramps, platforms, around machine areas and wherever slipping hazards exist. American Abrasive Metals Co.

5—ROOFING SYSTEM repairs worn roofs economically

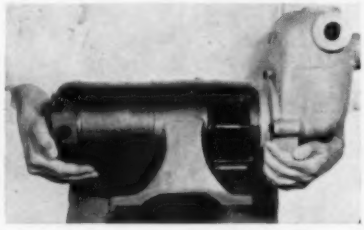
Badly alligatored roofs can be treated at reasonable cost with the Fiberflex Glass Roof System, it is announced. This is described as a tough, elastic, rotproof reinforced coating which presents a new surface to the weather. Essentially it is a coating of special watertight emulsion, reinforced with a strong glass fiber mat and topped with another coating of the emulsion. The mat serves to bridge the alligatored areas and present a uniform surface for the top coating of the liquid. The Philip Carey Mfg. Co.

3—STEEL SHELVING goes up faster and adapts to changes

Rapid-assembly steel shelving — called Erectomatic—can be set up in about half the time usually required for shelving, says manufacturer. It is designed to reduce installation costs, and afford maximum adaptability to changing conditions. This shelving features a locking device which holds each shelf in place and gives load carrying capacity, yet lets a shelf be removed or re-positioned quickly without use of tools. Shelves can be removed without tilting. They can be spaced on 3-in centers, and the full width and depth of each shelf is usable for storage as there are no obstructions at either end. Since bin fronts are bolted to the shelf, it is unnecessary to remove them to remove a shelf. When making up racks from a series of these units, common side-panels and up-right can be used. Shelving comes in three depths from 12 to 24 in.; four widths from 24 to 48 in., and seven heights from 39 to 111 in. Accessories for this new shelving include vertical dividers, back and side enclosures, sliding or swinging doors, others. Standard Pressed Steel Co.

6—CENTRIFUGAL PUMP is lightweight, self priming

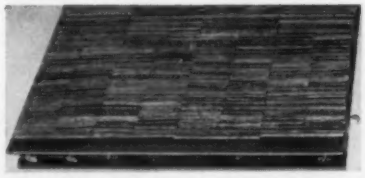
This self-priming, self-lubricating centrifugal pump is described as lightweight and corrosion resistant. Available in three ratings—½, ¾ and 1 hp—with a



choice of 1 or 1-½ in. suction and discharge openings, the monobloc pump features an extra-heavy shaft and Pyramid mount; has dual discharge openings for flexibility in piping. Solid aluminum casing, head and impeller makes the pump extremely lightweight (the ¾-hp unit with motor weighs only 62 lb). The pump has a rising head-capacity curve which suggests use for miscellaneous filter applications, and general service where a self-priming pump is required. Worthington Corp.

7—FLOOR PADS absorb shock from falling loads

Flex-O Rubber Floor Pads are designed to protect both products and floors by absorbing shock from falling loads. The

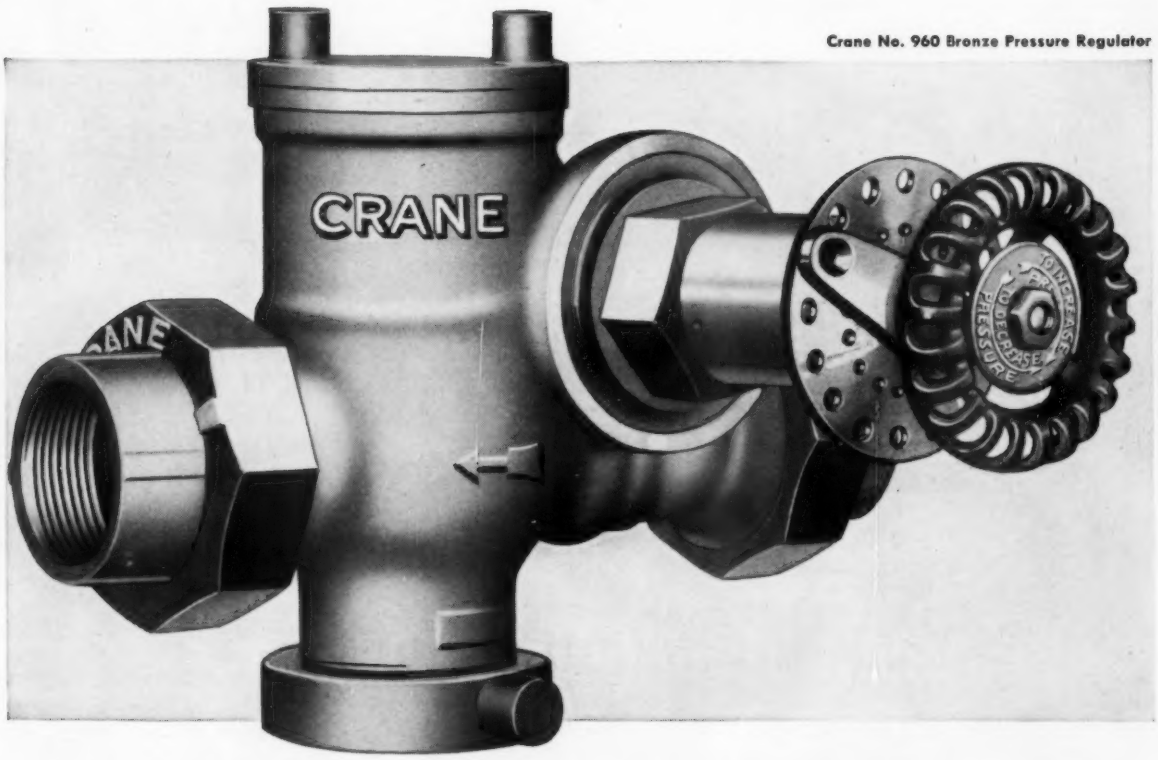


pads, which may be installed on the floor or recessed into specially built floor pockets, may be used in production or assembly areas, on loading docks. Constructed of steel channel frames and laminated segments of resilient rubber fabric, the pads are built for heavy duty service and come in two sizes. Bumpers, Inc.

8—COVERING protects existing tanks, structures

Quel-Flex is introduced as a corrosion-proof covering for field application to existing structures such as tanks or other chemical process equipment. Quel-Flex is made of sheets of plasticized polyvinyl chloride and is used in place of PVC plastisols in applications where dip coating or spraying is not feasible. These flexible, chemically resistant sheets are readily installed says manufacturer—you cut them to size, then cement them to the

Crane No. 960 Bronze Pressure Regulator



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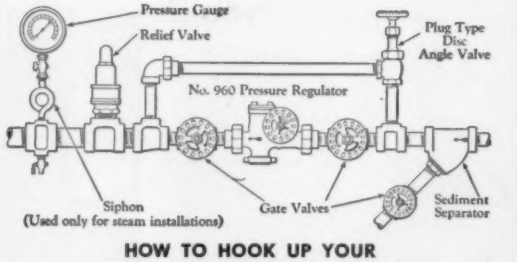
For accurate regulation of steam and air pressure, you're safe and sure when you specify Crane No. 960 Bronze Pressure Regulators.

Because they are Crane-designed and Crane-built for long, trouble-free operating life, these rugged, precision type regulators meet the most exacting requirements of modern heating systems, air blasts, cookers, driers, vulcanizers and other process equipment.

With Crane Bronze Pressure Regulators, outlet pressure cannot build up to inlet pressure when there is no steam or air demand on the outlet side. Equally important, ordinary fluctuations of inlet pressure do not affect the outlet pressure.

NEW LITERATURE ON REQUEST

Available in sizes ½ to 2 inches; maximum inlet pressures 250 pounds air or 250 pounds steam up to 450° F.



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NEW PRODUCTS

(Begins on page 172)

structure with a special three-part cement. Joints and corners are finished by heat-fusing flat butt straps or corner fillet straps in place with a specially designed hot air gun. Quelcor, Inc.

9—FLOOR MACHINES now come in three sizes

Self-powered combination Scrubber-Vac Machines, gasoline or propane operated, are now available in 18-, 30- and 36-in. brush spreads. Machines automatically apply cleanser, scrub, and pick up (damp-dry the floor)—all in one operation. The 30- and 36-in. sizes also flush-rinse if required. Slight pressure on hand clutch lever adjusts speed to desired rate (up to 150 fpm for the 18-in. size and 136 fpm for the 30- and 36-in. sizes). One engine operates all working parts. Monoxide eliminator, powder dispenser, and rinse assembly are among available accessories. Finnell System, Inc.

10—ELECTRONIC CLEANER traps the air-borne dirt

Electronic air cleaners with capacities from 1300 to 150,000 cfm and featuring an "automatic washing cycle" are announced for installation in ductwork of heating, ventilating and air conditioning systems. Electrical equipment is enclosed in a control cubicle. In operation, dust atoms flowing into the cleaner pass through a 13,000-v electrostatic "field" where they receive a positive electrical charge. These positively-charged particles are then attracted to negatively-charged collector plates (carrying 6500 v of electricity) and repelled by alternately-placed positive plates in the collector unit. After being collected on the negative plates, the dust particles are automatically washed away by a water spray.

It is pointed out that the cleaning units come in various sizes and can be arranged so their air handling capacity exactly matches that of the system fans to assure that air will be drawn through the cleaner at the correct velocity for greatest efficiency. Power requirements are rated: 50 w plus 10 w per 1000 cfm.

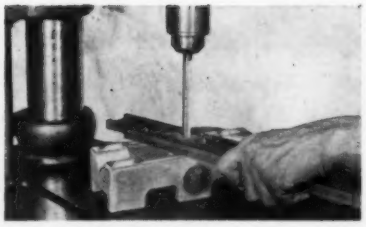
For example, the 1300-cfm capacity model, is 4-by-4-by-3-ft in size. It requires 65 w of power and uses 5 gal of water at 30 lb of pressure per cell each 7 or 8 mo. Prices are reported to average about 15 to 25 cents per cubic foot of air handled. Minneapolis-Honeywell Regulator Co.

11—PIPE INSULATION has white universal jacket

This low pressure pipe insulation, for cold, hot water and low pressure steam lines, contains a ½-in. thickness of fine fibered Fiberglas insulation and a jacket of heavy, bleached, creped Kraft paper laminated to aluminum foil. The outer surface with its off-white color presents a pleasing appearance, says company, and no additional finish is necessary although the jacket may be painted. The aluminum foil serves as a vapor barrier. The insulation is manufactured in two equal sections for easy installation. It is intended for use in temperature ranges of 50 to 250 F. For installation on hot lines, metal bands, stapling or other approved methods are recommended. On cold lines the insulation should be adhered using a white vapor adhesive. Sizes are ¼- through 12 in. for iron pipes, and ½-in. through 4⅛ in. OD copper tubing. It comes in 36-in. lengths. Owens-Corning Fiberglas Corp.

12—ABRASIVE SAW cuts through metal, pipe

The Abr-A-Saw is claimed to cut through any metal or pipe in record time. Features include compact, lightweight design for on-the-job portability; a foot operated V-wedge hold-down for locking material to be cut; double row protective ball bearings with air seal ring; full length removable chip and dust tray. With the Abr-A-Saw, 2-in. steel pipe can be cut in 6 sec; 4-in. steel pipe in 10 sec, company states. C. I. soil pipe, cold rolled steel, steel angle or channel, galvanized pipe and other metals are also handled by it. Also, it is noted, several pieces of metal, of different sizes and types, can be cut at once with this saw. Collins Machinery Corp.



13—COMBINATION UNIT holds work on machine

IMP Mules, combination parallel and V-block fixtures, are introduced for supporting work on drill presses, benches surface plates. They are said to be especially useful to the die-maker when mounting punch plates to punch holders for drilling. The center is open to accommodate the punch shanks. The V's at each end are accurately machined in line, it is stated, and can be adapted as a drill jig for rounds. It is not necessary to stop to remove burrs for each hole when drilling a number of holes in a flat piece, says manufacturer, and this tool eliminates the hazard of smashed fingers. Two sizes are offered. The smaller is 3¼ in. wide, 9 in. long and 2¼ in. high. It sells for around $9.00. Illinois Metal Products.

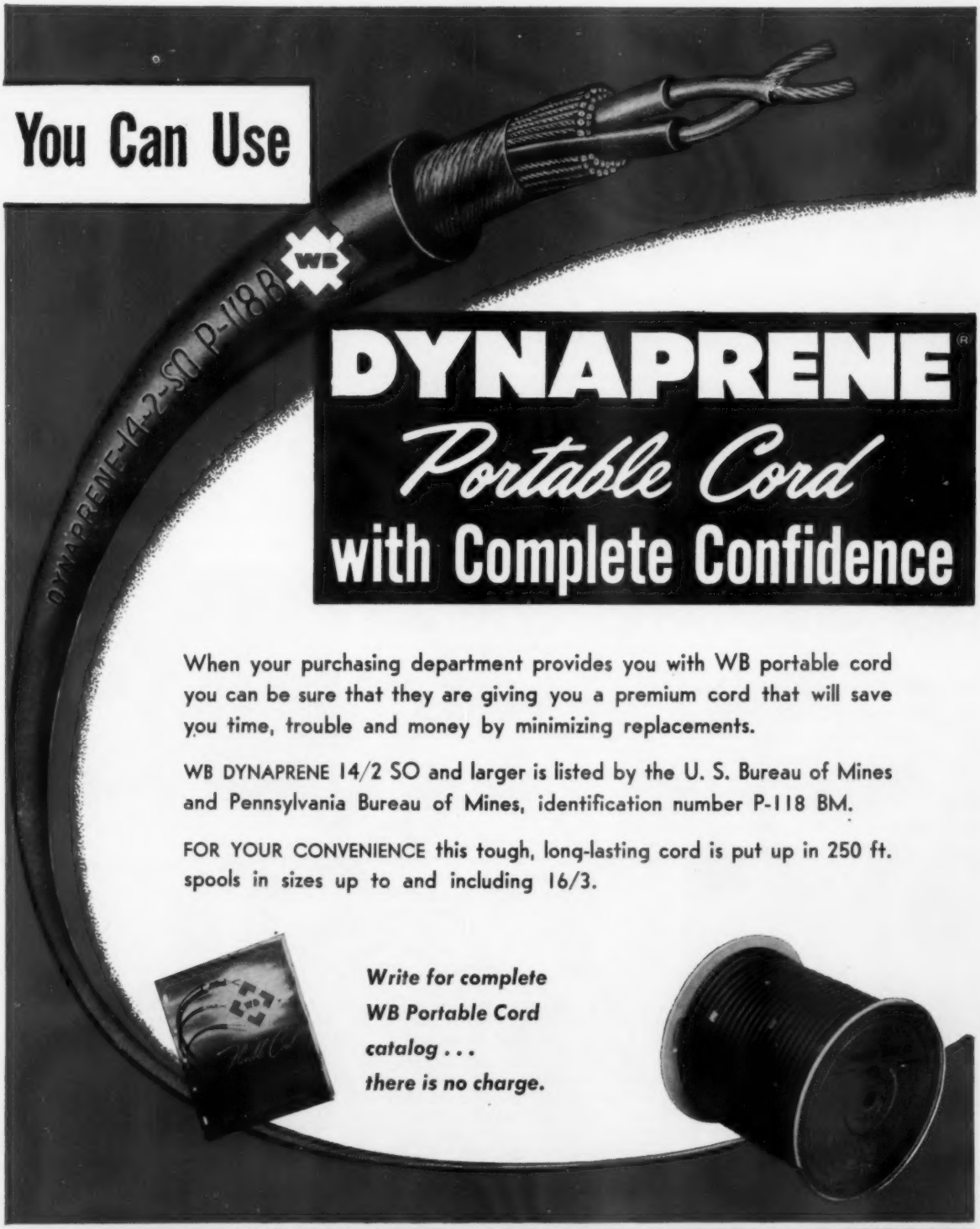
14—ADDITIVE keeps sludge out of the fuel oil

Used for several years in home heating oils, Fuel Oil Additive No. 2 is now reported to prevent operational problems of industrial heating plants using heavier and cheaper residual oils. The product is a sludge dispersant—it acts to prevent sludge and gummy residue from forming in storage tanks by keeping the tiny particles in the fuel from clustering together and settling to the bottom of the tank. Because the additive keeps the particles small, it prevents clogging of filters and burner nozzles, company points out. When used in large enough quantities and recirculated through the storage tank, it cleans out accumulated sludge, manufacturer states, and continued use keeps new sludge from forming. E. I. du Pont de Nemours & Co.

15—WELDING PROCESS cuts non-ferrous metals

The Aircomatic inert gas welding process, developed in 1948, can now be used for cutting non-ferrous metals in addition to welding ferrous and non-ferrous metals, company announces. Using standard Aircomatic welding equipment, this process requires no special operator techniques, it is noted, simple adjustments in gas flow and steel wire speed being all that is needed. Both machine and manual equipment can be adjusted. According to company, aluminum, stainless steel, chrome steel, nickel, Monel, Inconel, copper, brass and aluminum bronze have been cut with a quality satisfactory for subsequent welding operations. On ¼-in. plate, cutting speeds to 132 in. per minute are reported attainable on aluminum, 85 in. per

You Can Use



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NEW PRODUCTS

(Begins on page 172)

minute on stainless steel; severance cuts have been made on titanium and magnesium. Air Reduction Sales Co., Div., Air Reduction Co., Inc.

16—CAST ACRYLIC SHEETS come in a larger size

Called Plexiglas RL, these cast acrylic sheets come in sizes up to 8½-by-10 ft in both colorless transparent and translucent colors. They provide a surface area up to 85 sq ft, almost double that of previously available sheets. Colorless transparent sheets have been available in extra large sizes in the standard Plexiglas II UVA grade, but the new colorless RL sheets cost from 17 to 27 per cent less. RL sheets are expected to find application in internally-illuminated signs, in large area glazing, dome skylighting, fluorescent luminaires. Plexiglas RL is manufactured to the same surface standards and optical quality as Plexiglas R, company's commercial quality, untrimmed, unmasked acrylic sheet. RL is supplied as untrimmed, unmasked sheets in thicknesses of 0.187 and 0.250 in., in sizes ranging from 72 by 100 in. up to 102 by 120 in. Rohm & Haas Co.

17—LIFT TRUCK works in boxcars, yards, buildings

The Hyster 70, a pneumatic tire lift truck, is compact enough to work inside a single-door boxcar yet has the traction and capacity to handle 7000-lb loads over rough yard terrain, it is noted. Besides its combination of long wheelbase for

stability and compact dimensions for close-quarter work, this truck is also designed to feature maximum power to cope with the trend toward packaging of larger, more economically handled unit loads. Typifying its maneuverability qualities is a turning radius of 100 in. and a length of 106⅛ in.

The unit is powered by a heavy-duty Hercules gasoline engine. Large bore and stroke enables this 70-hp engine to develop a rated torque of 182 lb-ft at 1200 rpm. Hydraulic booster-type power steering is standard. One-piece frame and body provide maximum stability, company states. Hyster Co.

18—PROCESS for the manual welding of carbon steel

Developed to combine versatility of covered electrode welding and high deposition rates of submerged arc welding, Unionarc Welding is described as a semi-automatic metal arc welding process, using a continuously-fed bare wire, powdered magnetic flux, and carbon dioxide gas. Flux is carried to the welding nozzle by the CO_2 gas stream and surrounds the welding wire as it is fed from the tip of the torch. When welding current is flowing, a magnetic field is established around the extended portion of the welding wire. Flux is attracted toward the exposed wire and coats it. As wire is directed into the weld puddle, the flux melts, refining the weld metal and shielding it from atmospheric contamination. CO_2 flowing from the torch nozzle also helps to shield the molten metal and the arc. This open-arc characteristic is said to permit excellent visibility of the weld zone.

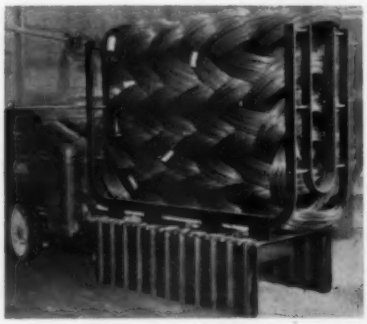
Welds made with this process can be made manually in flat, horizontal, vertical or overhead positions with speed, economy and quality, company states; speeds are 50 to 100 per cent greater, and total welding costs are 20 to 50 per cent less than with covered electrodes. Unionarc Welding is reported to produce high quality welds even when moderate amounts of rust, scale and moisture are present, as well as when there are minor gaps. Also it is claimed, the welds are characterized by soundness and a minimum of undercutting. D-c reverse polarity is preferred. At present, 3/32-in. and 3/64-in. diam welding wires are being used. Linde Air Products Co., Div., Union Carbide and Carbon Corp.

19—FLOOR WAX looks brighter, lasts longer

Waxtra is a water-emulsion floor wax formulated to give premium performance and reduce rewaxing frequency. It has a high solid content which, company says, assures more brightness when first applied and after each buffing, longer wear under heavy traffic conditions, more slip-retardant properties, greater dirt and water-spotting resistances, and absence of streaking or smearing. Waxtra is applied like other self-polishing floor waxes and dries with a high gloss claimed to increase under normal traffic and maintenance. Because of the hardness of the Waxtra film, it can be buffed with No. 2 steel wool to produce even a higher gloss, according to manufacturer. As a premium product, it is priced slightly above company's regular line. S. C. Johnson & Son, Inc.

20—GRAPHITE LUBE doesn't pick up dirt in use

Graphokote 95 is announced as a graphite lubricant which does not pick up dirt, dust or chips while in use, and withstands heavy pressures, weathering and water, acids or alkalis. Developed originally for railroad switches, the product is now offered to industry for all sliding surfaces and especially for materials handling equipment. The new lubricant has the consistency of paint and is applied with a brush. Dust, chips and other foreign matter will not get into or adhere to it after drying, says manufacturer, and a feature of Graphokote 95 is quick drying after application. Suggested applications include conveyor chains in saw mills, coal chutes, slat conveyors, slides on lift trucks, sliding doors, elevator guides, overhead crane hot rails and contacts. Joseph Dixon Crucible Co.



21—SKID RACK handles heavy gage wire coils

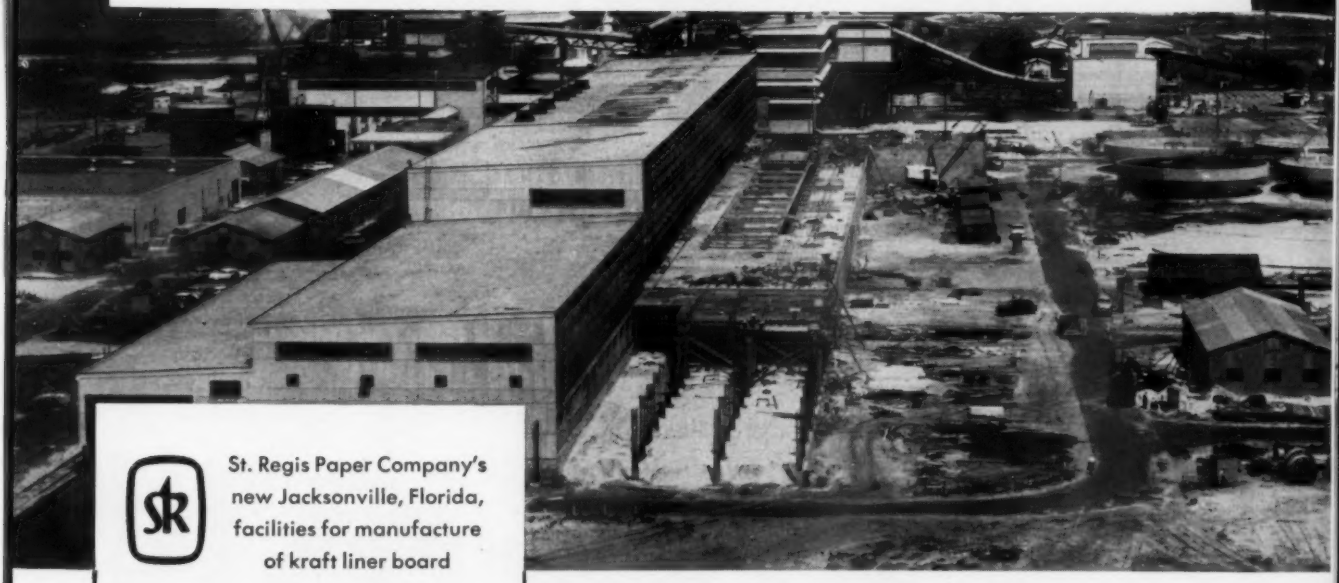
This combined skid and storage rack is claimed capable of accommodating up to 50 heavy gage wire coils at once. Intended to reduce the amount of individual coil handling, this one-piece unit consists of a corrugated steel skid welded to a U-shaped, open-side superstructure. The skid measures 36 in. wide, 72 in. long and has an 18-in. under clearance. The superstructure made of bar stock, is the same length and width as the skid, but is 54 in. high. Both skid and superstructure can be made to specified dimensions. Open sides of this rack permit easy access for loading and unloading, it is pointed out; at the same time, an entire load can be moved by platform truck. Pressed Steel Div., Republic Steel Corp.

22—HANDWHEEL OPERATOR for cylinder actuators

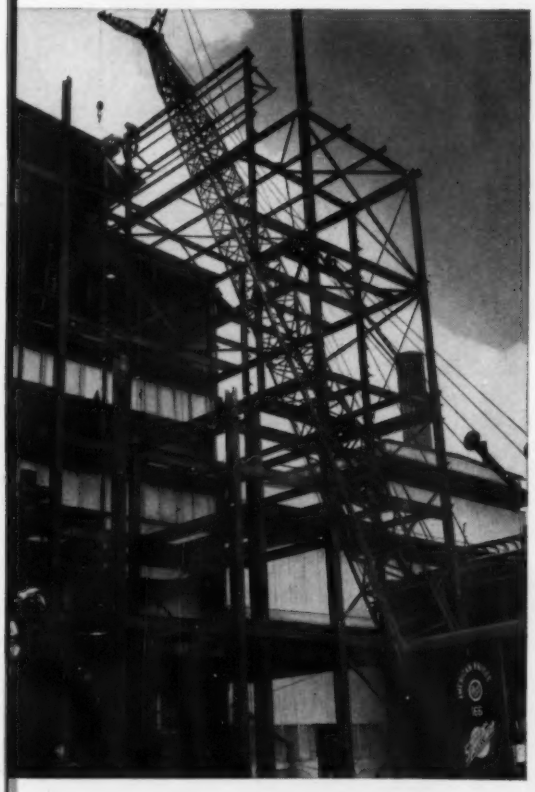
The Cono-Clutch is available as an integrally mounted accessory for company's standard line of cylinder Conomotor actuators—pneumatically positioned power actuators for throttling control on valves, motor driven speed changers, proportion-

For more facts circle 589 on Reply Card ——→

Down in Jacksonville—where St. Regis is spending $40,000,000 to expand its facilities



St. Regis Paper Company's new Jacksonville, Florida, facilities for manufacture of kraft liner board



-we're building a paper mill of steel!

With a modern pulp and paper mill located near Jacksonville, Florida, completed in 1952, already producing 350 tons of kraft paper and paperboard daily, St. Regis Paper Company is currently investing $40,000,000 in additional facilities which will enable the Jacksonville mill to produce an additional 1,000 tons of kraft liner board per day.

This is a big project involving the use of 5,000 tons of structural steel for the many large buildings and other structures required for the modern mill. All of this steel was fabricated and nearly all of it was erected by American Bridge.

The vast new mill was designed by J. E. Sirrine Company, Engineers, of Greenville, S. C., and Stevenson and Rubens, Consulting Engineers of Seattle, Wash. Tidewater-Auchter was the general contractor for the project.

In constructing this new mill for St. Regis, American Bridge utilized its experience, knowledge and skill to the advantage of everyone concerned with the project. All steelwork was erected with maximum speed, precision, economy and safety.

For detailed information regarding your structural steelwork requirements, please contact the office nearest you.

AMERICAN BRIDGE DIVISION, UNITED STATES STEEL CORPORATION
GENERAL OFFICES: 525 WILLIAM PENN PLACE, PITTSBURGH, PA.

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UNITED STATES STEEL

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Processing operations in a plant often release dust that settles on floors, walls and equipment. This dust hampers the efficiency of men and machines and makes plant housekeeping a continuing, costly burden.

Pangborn Dust Control stops that. Pangborn Collectors trap dust at the source, clean so thoroughly that in the winter many firms cut heating costs by recirculating the already-heated, cleaned air.

In addition, Pangborn gives you the bonus benefits of longer machinery life, more efficient employees, better employee and community relations and extra profits from any salvage value. Complete line of collectors for all jobs.

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Pangborn CONTROLS DUST

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NEW PRODUCTS

(Begins on page 172)

ing pumps, flow regulators, rheostats, autotransformers. This hand operator affords immediate manual control in event of air failure. It is said to be the only operator of its type which can be instantly thrown in and out of gear at any position of stem travel. Clutching and declutching are accomplished simply by pulling or pushing a knob. No special tools such as pins, latching devices and hand cranks are required. All gears are enclosed in an aluminum housing. Bulletin LB-2 gives details. Conoflow Corp.

23—POURABLE CONCRETE sets anchor bolts quickly

Evr-Tite is announced as a pourable cement that will set anchor bolts in 10 min. The light gray powder mixes with water to form a semi-fluid, easily-poured compound which, when applied around an anchor bolt, attaches itself to the bolt

surface and fills all sections of the hole. Then, in 10 min, it is said to set with a minimum of shrinkage or "pulling away" from either bolt or hole. According to company, anchor bolts cemented with Evr-Tite can be drawn tight and light equipment put in operation within a half hour. For heavy vibrating machinery, Evr-Tite achieves high impact strength in less than one hour. Evr-Tite is suggested for securing anchor bolts in fastening of pipe flanges, hand rails, partitions, parking stanchions, and for repairing shallow holes in concrete. Form 109 gives details. The Monroe Co., Inc.

24—CENTRAL HUMIDIFIER automatically controlled

The Humid-i-maker is introduced as an automatically controlled, evaporative-type humidifier for buildings with hot water, steam or warm air heating systems. It operates by circulating air across the surface of heated water and into a central distribution duct. The unit consists of a closed stainless steel tank containing submerged copper heating coils and a water-level control. A blower on the top of the tank circulates air. Hot water for the coils is pumped from a boiler or hot water heater. A humidistat controls both blower and hot water pump. Fill water is taken from the regular soft water supply.

The humidistat serves to maintain closely the degree of humidity set by the user. Large capacity is obtained by heating the water—air picks up more

Plexiglas... useful in so many ways around the plant

For safety guards, protective covers, inspection windows, glazing and many other industrial plant uses, PLEXIGLAS® acrylic plastic is a mighty handy material.

PLEXIGLAS is crystal clear and highly impact-resistant. It can be formed to almost any shape, and machined like wood or soft metals. PLEXIGLAS resists corrosive atmospheres . . . weather . . . breakage . . . and has excellent electrical properties.

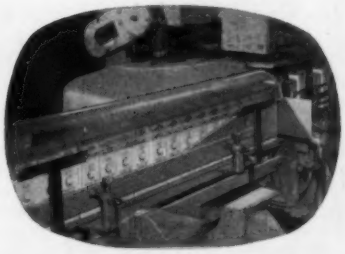
Does the availability of a material with this combination of advantages suggest ways in which it could solve operating and maintenance problems in *your* plant? Your nearest PLEXIGLAS dealer will be glad to be of service. Ask him about PLEXIGLAS R, the lower-cost grade that is so suitable for industrial applications.

Chemicals for Industry

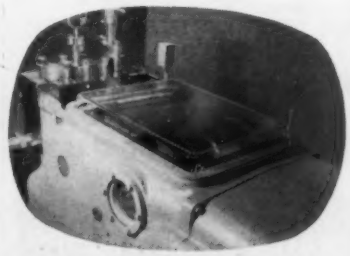
ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Representatives in principal foreign countries



Curved hood of transparent PLEXIGLAS on conveyor line gives clear view of packaging process, protects contents of open packages.



Formed PLEXIGLAS cover on demonstration model of milk homogenizer permits safe inspection of machine parts in operation.

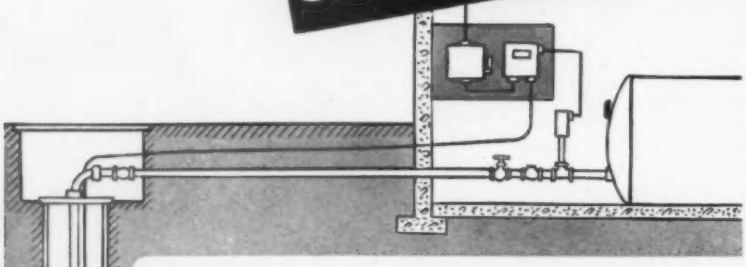
PLEXIGLAS dealers maintain stocks of clear and colored material for prompt delivery, can supply detailed information and expert advice on specific uses. They are listed under PLEXIGLAS in the Plastics section of telephone directories of most large cities.

Canadian Distributor: *Crystal Glass & Plastics, Ltd. 130 Queen's Quay East, Toronto, Ontario, Canada*

For more facts circle 591 on Reply Card

A New Lift for plant water supply needs!

THE COMPACT, HIGH-CAPACITY
SUMO SUBMERSIBLE



Here's a commonsense pump for any plant that depends on a deep well water supply. The SUMO SUBMERSIBLE employs a time-tested design backed by over 30 years experience in the manufacture and application of submersibles, exclusively.

Pump and motor — coupled together as a unit — operate inside the well, underwater. No pump house is needed.

Water delivery is obtained by *pushing* — not by suction. Since the water is under pressure, there are no priming problems. Shaft alignment troubles, common to pumps in which the motor is surface mounted, are eliminated.

What's more, the SUMO SUBMERSIBLE can be quickly, easily and economically set deeper to compensate for receding water levels.

Information every plant engineer should have . . .

Bulletin B-1000 provides a comprehensive description of the SUMO SUBMERSIBLE PUMP—and its many advantages as a basic water supply pump for industry.
WRITE FOR YOUR FREE COPY.

SUMO PUMPS INC.
Dept. 2 Box 983
STAMFORD, CONN.

Sumo **SUBMERSIBLE WATER SUPPLY PUMPS**
Sold and serviced by leading pump distributors.

For more facts circle 592 on Reply Card

NEW PRODUCTS

(Begins on page 172)

moisture from hot water. And since the moisture is evaporated, impurities and water droplets are not carried along, it is noted. The unit can be suspended from the ceiling or mounted on a floor stand. It includes covered tank, coils, float valve, blower, duct connection, humidistat and transformer-relay box, and comes ready for installation. Capacity is sufficient for up to 33,000 cu ft of space. Armstrong Machine Works.

25—LUBE POWDER withstands high bearing pressures

Molylube No. 16-Microfine is described as a specially treated molybdenum disulfide powder having a particle size of less than one micron. Tests are reported to show that it prevents galling and seizing at bearing pressures well over 100,000 psi. High film strength, low co-efficient of friction and tenacious adherence to metal surfaces are also reported. In powder form, Molylube No. 16-Microfine is suggested for use wherever dry-filmed lubrication is desirable. It may be dispersed in oils and greases to increase high pressure properties. Bel-Ray Co., Inc.

To receive product data circle item numbers on the handy Reader Service Cards provided on pages 257-258.

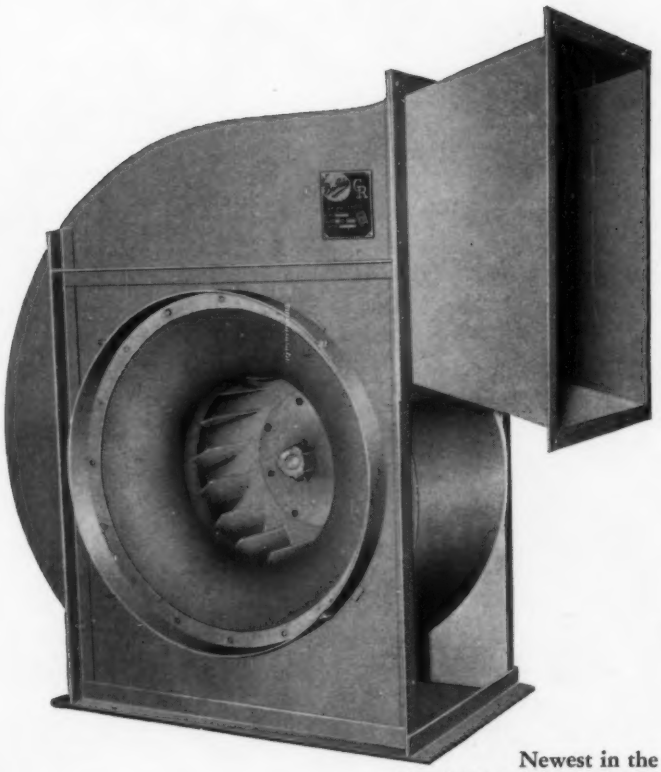
26—COMPOUND goes on new or old concrete floors

Super-Patch is an easily-applied compound that stands heavy industrial traffic and contains an anti-bacterial ingredient that meets sanitary requirements of food and dairy plants, it is announced. It is claimed to prevent disintegration of floors by inhibiting molds and fungi, and to control odors. It is used for patching or repairing worn floors, and as an armor for the topping of new concrete. Manufacturer says that Super-Patch hardens and densifies to provide concrete with a compressive strength up to 10,000 psi. It is shipped dry, comes in natural gray or colors. Maintenance Engineering Co.

27—OUTDOOR MOTOR is protected against weather

For non-hazardous outdoor installations, the Type FOD Motor is available in ratings of 250 hp and larger. It is built into a fabricated steel frame equipped with two removable air ducts. Capsule mounted sleeve bearings are supported by cast iron bearing brackets which close the end of the frame. The frame houses a removable pre-wound stator assembly unit. Stator leads, enclosed and protected, are brought to a diagonally split cast iron conduit box.

Heavy steel removable air intake ducts have openings at each end, and are de-



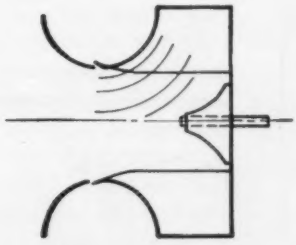
NEW

"BUFFALO" TYPE "CR" RADIAL BLADE FAN

Engineered for Your High-Volume High-Pressure Jobs

Newest in the complete line of "Buffalo" Fans, the Type "CR" offers high mechanical efficiency (above 78%) over a broad range, and has high-pressure, high-volume characteristics that make lower first cost possible on many applications. It is also highly suitable for handling dust-laden air efficiently.

In the illustration of the "CR" wheel, you will note the deeply pressed, curving flange. It provides rigidity and meets the curved inlet bell to form a true half-circle air entry path into the wheel (shown in cross section diagram). Wheel blades are radial at tip, curving smoothly forward at inlet. The streamlined housing with divergent outlet further minimizes abrasive effects and aids efficiency by reducing turbulence. While "Buffalo" builds other type fans of higher efficiency than the "CR", its highly desirable balance of favorable first cost, high efficiency and long life assure substantial overall savings in heavy industrial service. Write for new Bulletin FD 205 and see the "Q" Factor* features built into this quality fan.



**The "Q" Factor — the built-in Quality which provides trouble-free satisfaction and long life.*

BUFFALO FORGE COMPANY

BUFFALO, NEW YORK

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

"Buffalo"

VENTILATING AIR CLEANING AIR TEMPERING INDUCED DRAFT EXHAUSTING FORCED DRAFT COOLING HEATING PRESSURE BLOWING

For more facts circle 593 on Reply Card

SPECIAL MACHINES —MEN

2 Reasons Behind Brad Foote Quality

• The craftsman shown below is loading a gear into one of the latest additions to BRAD FOOTE'S long list of special-purpose machines. The only one of its kind in existence, this new shaver can straight or crown shave gears up to 51" in diameter. Normally accommodating gears with shafts up to 142" between centers, it can handle even longer shafts by using special journals. Specially designed, the new machine will shave either internal or external gears.

• Costly special machines such as this are important in providing the extra quality at lowest cost which is the hallmark of BRAD FOOTE gears. But these are only part of the story. Even more important, perhaps, are the men who man these machines—experienced craftsmen with long experience in producing gears to meet the most exacting and specialized requirements.

• BRAD FOOTE'S facilities are at your disposal whether you need one gear or a long production run. We would sincerely appreciate an opportunity to discuss your requirements or quote on your specifications. Your inquiry will receive prompt attention.

BRAD FOOTE GEAR WORKS, INC.

1302 South Cicero Avenue • Cicero 50, Illinois
Bishop 2-1070 • Olympic 2-7700 • TWX: CIC-2856-U

subsidiaries

AMERICAN GEAR & MFG. CO.
Phone: Lemont 920
Lemont, Illinois

PITTSBURGH GEAR COMPANY
Phone: SPalding 1-4600
Pittsburgh 25, Pennsylvania

For more facts circle 594 on Reply Card

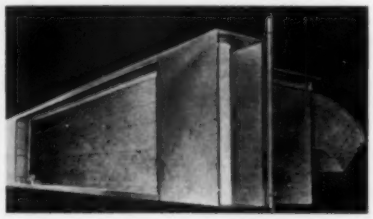
NEW PRODUCTS

(Begins on page 172)

signed to minimize effects of high velocity winds and entrance of entrained moisture and particles into the electrical parts of the machine. The motor's contour provides natural drainage. Gutters above air intake openings prevent water from falling into air intake stream. Immersion type space heaters for use during periods when a machine is inactive are standard equipment. Bearing temperature relays and detectors, stator temperature detectors, and stator winding thermoguards are available. Suggested applications include refining, chemical plants, power house auxiliary drives, cooling towers, general pumping. Allis-Chalmers Mfg. Co.

28—AIR HANDLERS with automatic filtration

Once-a-year maintenance and automatic filtration are announced for the new Roll-O-Vent line of industrial unit heaters, heating and ventilating units, and air conditioners. Automatic filtration is by means of a continuous glass fiber curtain that moves horizontally through

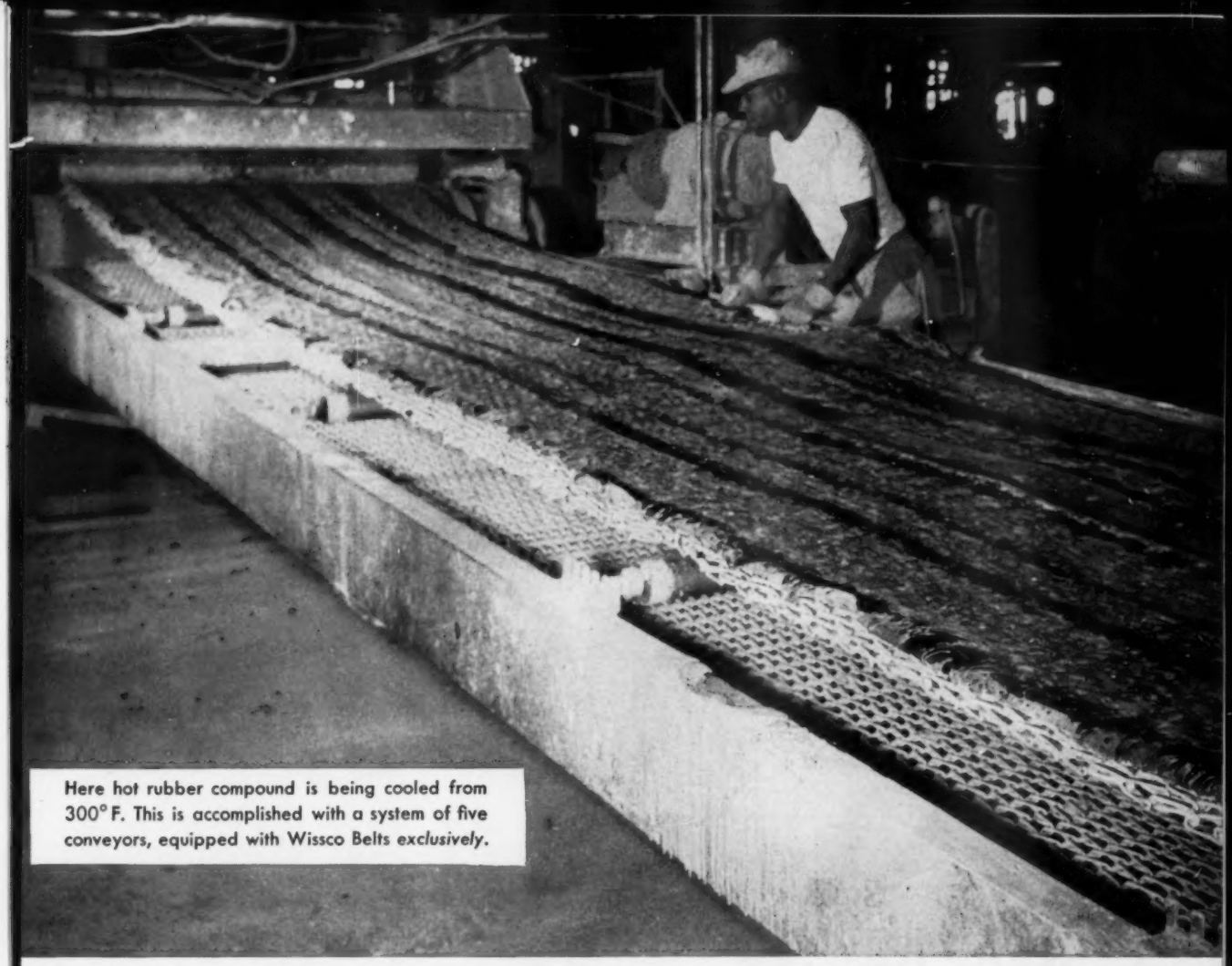


the entering air stream just ahead of the coils and fan sections. Fresh media is automatically supplied to the air stream by a timer. Under normal conditions, the spool of media would need replacing only once a year, according to manufacturer.

It is explained that since clean media is periodically introduced, filter resistance remains constant. Media density is graduated by increasing the number and decreasing diameter of the fibers from the front to rear of the mat. This is to provide progressively more efficient air cleaning and to apportion the dust load through the mat. Filtering media is composed of continuous, slightly curled glass filaments, held in place with a thermosetting plastic to form a resilient pad or "blanket," and impregnated with a non-flammable, viscosine for use at temperatures to 150 F. The basic Roll-O-Vent unit consists of a fan section, a coil section and the automatic filter. Standard and non-freeze steam coils are available. American Air Filter Co., Inc.

29—HEAT FABRIC is durable, has many uses

Ray-Tex is described as a fire- and heat-resistant fabric with remarkable toughness, durability and variety of applications. It was developed by interfusing an aluminum compound with a special



Here hot rubber compound is being cooled from 300° F. This is accomplished with a system of five conveyors, equipped with Wissco Belts *exclusively*.

FAMOUS NAMES

ride on WISSCO BELTS

Goodyear Tire and Rubber Company • Topeka, Kansas

Goodyear, a name long known for top-quality rubber products, has been using Wissco Belts for cooling operations in its Topeka, Kansas, plant for more than a decade.

Each belt in this system handles over 12,000 pounds of hot compounded rubber product per hour . . . 23¼ hours a day . . . six or seven days a week. With the average belt service having proved to be two years, this means that *each* belt conveys more than *17 million* pounds of rubber during its lifetime.

Years before the Topeka plant was opened in 1945, Goodyear had been testing, evaluating and using Wissco Belts in its Akron plant—with uniformly good results. No wonder then, for the past twelve years, Goodyear has specified *only* Wissco Belts for its Topeka cooling operations.

As with Goodyear, Wissco Processing Belts are the choice of many famous names in industry—leaders in their fields. If you are not already a Wissco Belt user, it'll pay you to get full details on how these efficient and economical belts can help you in your own operations.

THE COLORADO FUEL AND IRON CORPORATION
Denver and Oakland
WICKWIRE SPENCER STEEL DIVISION
Atlanta • Boston • Buffalo • Chicago • Detroit • New Orleans • New York • Philadelphia
CF&I OFFICES IN CANADA: Montreal • Toronto

CF&I **WISSCO BELTS**

PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION

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4632

Rugged Versatile Fan

BACKED BY APPLICATION ENGINEERING ASSISTANCE OF FACTORY SPECIALISTS

5400 to 36000 CFM *(Certified)*

34" to 48" BLADES

R & M-HUNTER Direct-Drive Industrial Fan

FOR SIDEWALL · PENTHOUSE · SPOT COOLING INSTALLATIONS

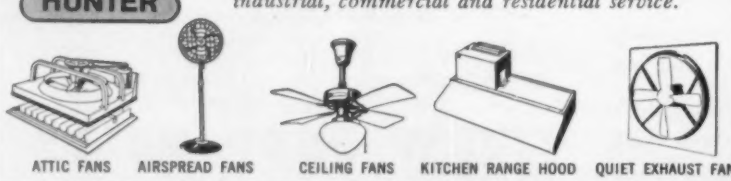
QUALITY FEATURES . . . QUALITY PERFORMANCE

- Powerful — effective up to ½" static pressure
- Streamlined air inlet 15% to 18% more efficient
- Direct drive reduces maintenance
- Square steel frame forms easily installed mounting panel
- Totally enclosed, ball-bearing motor
- Automatic shutters to fit all sizes

Write for complete data and prices

HUNTER

HUNTER DIVISION-ROBBINS & MYERS, INC.
2438 Frisco Ave., Memphis 14, Tenn.
Manufacturers of a complete line of fans for industrial, commercial and residential service.



ATTIC FANS · AIRSPREAD FANS · CEILING FANS · KITCHEN RANGE HOOD · QUIET EXHAUST FANS

For more facts circle 596 on Reply Card

NEW PRODUCTS

(Begins on page 172)

fabrication of cotton cording. Manufacturer of Ray-Tex says that it will not crack, peel or slough off in heat or cold, and that it is highly resistant to rough usage, to oils, greases and most acids and alkalies. It may be cleaned with solvents, steam or soap and water. Ray-Tex is available in fire blankets, self-standing shields, curtains. A test swatch is offered. Frommelt Industries.

30—PLASTIC PANELS feature built-in metal mesh

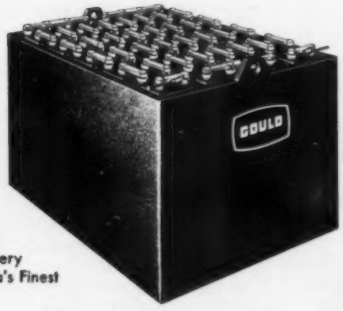
Called Security Junior, these glass fiber-reinforced plastic panels feature embedded aluminum or steel diamond mesh. The metal-reinforced translucent panels offer unusual architectural design possibilities, company says, as well as semi-transparent protection against flying particles and

liquid spray. They may also be used for protective skylights, windows, and other fenestration. Panels are claimed to have high impact resistance. In aluminum, panels consist of 0.081 gage expanded aluminum embedded in flat Resolite sheets using 1½ oz Fiberglas mat. In steel, panels consist of 16-18 gage expanded steel embedded in similar sheets. The plastic sheets are available in both standard and in a special, fire-retardant type, in clear and in five colors. Light transmission values range from 71 per cent (clear) to 15 per cent (coral), with average transmission at 50 per cent. Panels come in lengths of 8 and 10 ft, widths of 1 to 4 ft. Resolite Corp.

31—ROTARY PUMP puts hydrazine in make-up water

According to manufacturer, this molybdenum-free stainless steel pump is designed specifically for injecting hydrazine into make-up water for boiler feed treatment. Teflon impellers and bearings are standard equipment. A choice of stuffing box assemblies includes plastic Teflon packing or a fluid Teflon stuffing box seal, both of which are designed to prevent air ingress into the pump. This low-capacity, positive displacement pump, with its two axially opposed oscillating impellers, produces a linear, non-surging flow, it is noted. Capacities are to 10 gpm, pres-

PLAY SAFE... buy the battery that gives you "extra runs" every year.



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Industrial
Truck Battery
—America's Finest

Gould application engineers provide you with a continuing service that helps you keep batteries running longer. Try us and see.

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More Power to you from Gould

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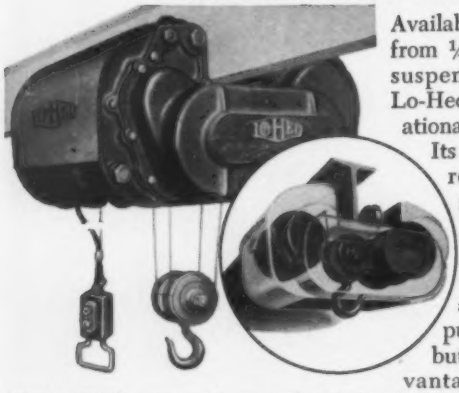
Materials handling is easier, cheaper, with
LO-HED HOISTS

WHICH TYPE OF LO-HED IS BEST FOR YOU?

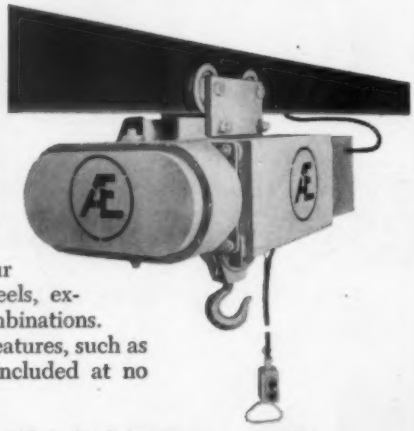
HERE'S THE FAMOUS CUSTOMIZED LO-HED



Available in a range of capacities from ¼ ton to 12 tons... and five suspension types... Customized Lo-Hed is feature-packed for operational speed, safety and economy. Its design provides low headroom. It's built for longer service life. The bottom block is shrouded. The hook, on an oil-impregnated bearing, prevents fouled lines. On a-c installations a transformer puts only 110 volts at the push-button. And all these extra advantages are yours at no extra cost... Talk over with your local Lo-Hed representative the adaptability of Customized Lo-Hed for your special requirements.

AND HERE'S THE PACE-SETTING STANDARD LO-HED

Standard Lo-Hed, as you've heard, is the sensation of the heavy duty hoist field. Available in 2 and 3 ton capacities, it's truly a standard hoist; quantity-produced and ready for shipment from stock. The last word in modern engineering and materials, its welded steel chassis combines light weight and rigidity. Its straight line spur gear drive eliminates worm-wheels, extended shafts and split gear combinations. Its price is right, too, and extra features, such as lower limit safety switch, are included at no extra cost.



Write for literature describing either the Customized Lo-Hed or the Standard Lo-Hed, or both. Lo-Hed Hoists are cutting material handling costs in plants from coast to coast. American Engineering Company, Dept. H-164, Philadelphia 37, Pa.

LO HED

AMERICAN ENGINEERING
COMPANY
Philadelphia 37, Penna.
Affiliated Engineering Corporations, Ltd., Montreal 16, P. Q.
Bowden Industries Ltd., Toronto 3, Ont.
AE Products are: Marine Deck Auxiliaries, Hele-Shaw and Hydramite Fluid Power, Lo-Hed Hoists, Lo-Hed Car Pullers, Taylor, Perfect Spread and Vibra-Grate Stokers.

For more facts circle 598 on Reply Card

NEW PRODUCTS

(Begins on page 172)

sures to 75 psi. Higher pressures are obtained by multi-staging. Pumps are available in conventional mountings, and with electric motor, air motor, pulley and chain drives. Eco Engineering Co.

32—CONVEYOR BELTING installs flush with floor

In some respects Flat-Top Conveyor Belting resembles the moving sidewalk, says manufacturer, and it is advantageous for use in flush-with-the-floor applications for heavy duty assembly work. Belt clearances are reported such that ordinary nuts, small wrenches and tools will not fall through the belt.

Length, width, speed and carrying capacity of the belt can be varied to the job application. Because there are no parts that extend above the belt, it can handle products or stock wider than the belt itself and these can be placed on the conveyor at right angles to belt travel. With the exception of small pieces, parts can be plowed off the belt at selected stations.

End-curved, interlocking and overlapping belt links serve to provide a flat, almost smooth-top carrying surface. At each pitch, through shafts extend to join the side chains and position them. Intermediate connectors that fit over the through shafts and are attached to the underside of the belt, tie the entire construction into an integral unit that is claimed rigid but readily assembled. May-Fran Engineering, Inc.

33—MERCURY LAMPS give more light and cost less

Two new white mercury lamps are announced as offering three major advantages: as much as 63 per cent more light just by changing from old type lamps; as much as 33 per cent lower cost of light; better white color than from other clear mercury lamps. The improved performance is attributed to a new strontium magnesium orthophosphate phosphor which converts ultra-violet radiation into more white light than formerly possible.

The new lamps are the H400-RW1, a reflector lamp which not only directs two-thirds of the light to the work surface but also seals the reflector against dirt

They cut out three oils by changing to one...

STANICUT Oil 166 BC

Screw machine plant saves on oil inventory and handling, receives other benefits by converting to dual-purpose cutting oil.

Standard Oil lubrication specialist Bob Cleland and plant manager I. G. Smallegan inspect machined piece. Giving technical help to customers like this is something for which Bob Cleland is well fitted. Bob has a mechanical engineering degree from Michigan State University and has completed the Standard Oil Company Sales Engineering School.

Grand Rapids Metal Products Company's problem was the mixing of cutting and lubricating oils in their National Acme and Gridley screw machines. In all, four oils were used. In some machines a cutting oil, two lubricating oils and a base oil were employed to improve machining characteristics. Lubricating oil leaking past seals mixed with the cutting oil, reducing cutting oil qualities. Oil mixtures were constantly varying, and troubles in tapping resulted.

Standard Oil's Bob Cleland, working with plant management, suggested STANICUT Oil 166 BC. This oil, he explained, is a dual-purpose oil. It can be used for lubrication as well as for cutting. In such applications, no dilution of the cutting oil can occur.

After a week's trial in one machine, the entire plant was converted to STANICUT Oil 166 BC. Tap troubles were reduced, resulting in much less down time. Spindle speeds have been increased, yet the spindles run cool. Four oils were formerly kept in stock. Now only one is needed.

STANICUT Oil 166 BC does not corrode bearings, gears, bushings, spindles or other machine parts. While the oil contains E.P. additives, it does not stain copper or brass.

Get the facts on how STANICUT Oil 166 BC can help you. Call the Standard Oil office nearest you anywhere in 15 Midwest and Rocky Mountain states. Or write Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

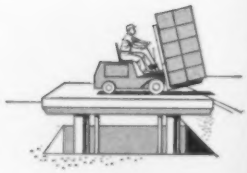
Quick facts about
STANICUT OIL 166 BC

1	A dual-purpose oil — suitable for both cutting and lubrication.
2	Non-corrosive to work or machines.
3	Formulated with E.P. additives.
4	Stable under all normal conditions.
5	Non-irritating.
6	A cutting oil that permits high operating speeds.
7	Non-staining to either copper or brass.

STANDARD

STANDARD OIL COMPANY
(Indiana)

For more facts circle 599 on Reply Card



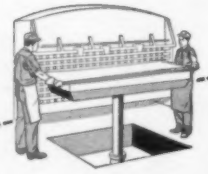
1,000
TO 100,000 LB.
CAPACITIES

Rotary Levelator® Lifts handle heavy loads faster and cheaper

Adaptable to many uses—Economical Rotary Levelator Lifts permit loading and unloading trucks and freight cars direct from plant floor level. Expensive loading docks and ramps are eliminated . . . buildings may be erected on grade at big savings in construction costs. Levelator Lifts also solve the problem of moving materials from one floor level to another and can be used in other ways to speed plant traffic and cut labor costs. When lowered, the lift is level with the plant floor and can be trucked over. Installation is easy, and there's no maintenance problem.

Economical to operate—Rotary Levelator Lifts operate on dependable, low-cost Oildraulic (oil hydraulic) power, using compressed air or electric power unit. A standard model will handle 12,000-lb. loads. Others are built to requirements for lifts of 1,000 to 100,000 lbs. Mail coupon for literature or write our Industrial Division, describing your lifting problem.

Machine Feeding—Levelator Lifts handle loads faster and cheaper than men or makeshift methods and keep materials at the right height for continuous feeding.



MAIL NOW FOR COMPLETE DATA

Rotary Lift Co.
1059 Kentucky, Memphis 2, Tenn.
Please send literature on Rotary Levelator Lifts.

Name_____ Company_____

Address_____

City_____ State_____

Rotary®

LEVELATOR® LIFTS

See Rotary Lift Co., Booth No. 1101, National Materials Handling Exposition, Philadelphia

For more facts circle 600 on Reply Card

NEW PRODUCTS

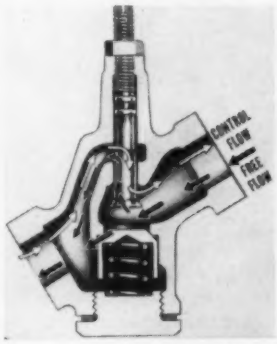
(Begins on page 172)

and fumes, and the H400-EW1, in the familiar bulged tubular shape. The latter is rated at 23,000 lumens at a list price of around $23. The H400-RW1, rated at 22,000 lumens, costs slightly more. The economic life of the lamps is given as 6000 hr. The H400-RW1 is intended mainly for industrial areas and expected to be the more popular because the reflector inside the bulb gives higher lighting levels with less maintenance. The H400-EW1 is also for industrial installations as well for outdoor lighting. The lamps can be used in existing equipment. General Electric Co.

Reader Service Cards on pages 257-258 make it easy to get further information on any of these products. Just circle the item numbers of the products you would like to know more about.

34—SPEED CONTROL VALVE with screw driver slot

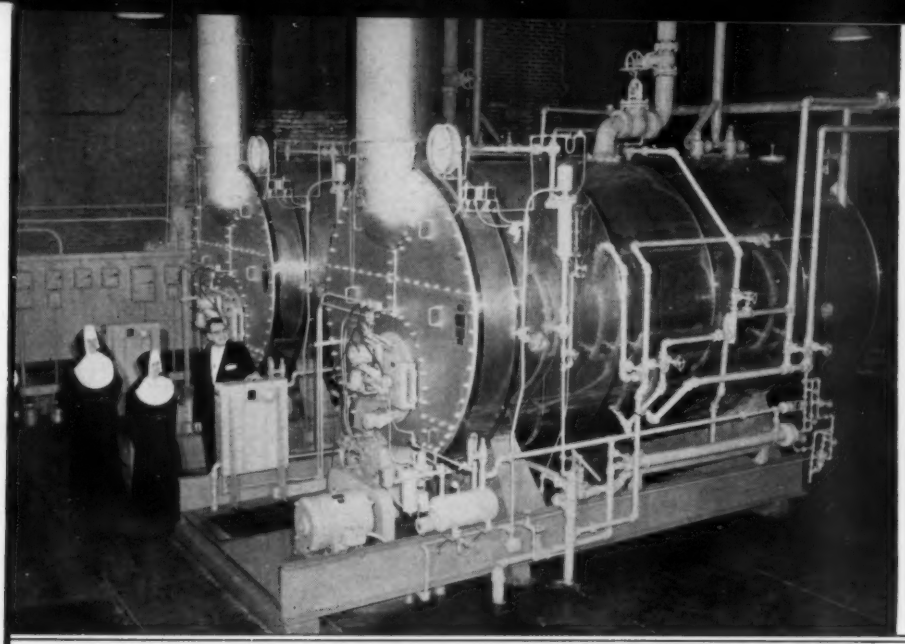
This speed control valve is designed to provide split-second timing of piston movement by positive control of air flow. It can be mounted in any position, at



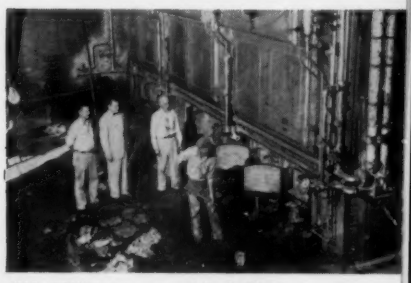
either or both ends of a cylinder to provide air flow adjustment. Manufacturer says it can be disassembled easily without breaking the line connection, and its construction is simple because the only moving part is the poppet. The valve features a screw driver slot, but it is also available with regular knob adjustment or with a pin lever adjustment. Ross Operating Valve Co.

35—PUMP PACKING is self-forming, resists chemical

403 Plastic Teflon Packing is described as a self-forming packing well-suited for emergency use against industrial acids, alkalies and solvents. This packing is composed of shredded Teflon combined with suitable binders and lubricants ex-



NEW BOILERS combine efficiency and handsome appearance. Edward S. Green, Edgemont (Pa.), contractor, was responsible for this superior installation. Pictured left to right are: Sister M. Cor Immaculatum, Immaculata College Treasurer, Sister Jean Marie, Community Treasurer, Reverend Mother Maria Alma, Superior General and Salvatore S. Guzzardi, Consulting Engineer.



OLD BOILER was a coal-fired HRT model — typical of many replaced by modern Cleaver-Brooks oil, gas or combination oil/gas fired boilers.

Consulting engineer* tells how Immaculata College boiler modernization saves estimated $12,000 each year

Salvatore S. Guzzardi CONSULTING ENGINEER

2928 LEWIS TOWER · PHILADELPHIA 2, PA · KINGSLEY 6-2777

December 20, 1956

Mr. John C. Cleaver, President
Cleaver-Brooks Company

Dear Mr. Cleaver:

Recently our office was retained to make an impartial, exhaustive engineering study of the 40-year old boiler plant and steam system at Immaculata College, Immaculata, Pa., which is staffed by the Catholic order, Sisters of the Immaculate Heart of Mary.

As a result of our recommendations, two fully automatic, oil-fired, 350 bhp Cleaver-Brooks package steam boilers, (12,000 lbs/hr steam each), replaced three hand-fired coal boilers and steam-driven auxiliaries. The new boilers are operating at approximately 80% boiler efficiency year-round.

Conversion of coal firing to automatic #6 oil firing and increased boiler efficiency has reduced the fuel cost approximately 50% -- amounting to a saving of $12,000 each year.

The Cleaver-Brooks boilers burn #6 oil and operate automatically at 80 pounds steam pressure 'round the clock -- without the presence of operators in the boiler room. Eliminating boiler plant labor saves the College $7,500 each year.

The cost of the boiler plant modernization will be paid for out of fuel and labor savings in approximately 2-1/2 years.

Commendation for this outstanding performance of the Immaculata boiler plant is due to your well-engineered boiler design and to the cooperation of your skilled servicemen. The results achieved were so impressive that the Sisters subsequently modernized their Villa Maria Convent, Westchester, Pa., with two 100-bhp Cleaver-Brooks boilers.

Sincerely yours,

Salvatore S Guzzardi

***Salvatore S. Guzzardi** — Award-winning head of an organization of experienced professional engineers specializing in modernizing power service facilities. Clients include: Pennsylvania University, Baldwin-Lima-Hamilton Corp., H. Daroff & Sons, Sun Shipbuilding & Dry Dock Co. and City of Philadelphia.

Surveys show 32% of boilers now in service are 30 years old; 56% are over 20 years old

If your boiler fits this description, we recommend an immediate survey. "In 90% of the plants surveyed," summarizes Mr. Guzzardi, "we have found it possible to save thousands of dollars and to pay for the recommended improvements out of annual savings within one to three years."

Again and again the proved economy of Cleaver-Brooks four-pass, forced-draft boiler design results in savings reports as impressive as this. Contact your nearest Cleaver-Brooks representative for more facts on the complete line of steam and hot water boilers — 19 sizes, 130 models, 15 to 600 hp — for heating or processing. Or write Cleaver-Brooks Company, Dept. C, 364 E. Keefe Ave., Milwaukee 12, Wis., U.S.A. Cable Address: CLEBRO — Milwaukee — all codes

Cleaver Brooks

ORIGINATORS OF SELF-CONTAINED BOILERS

For more facts circle 601 on Reply Card

HERE'S A STEAM TRAP EYE OPENER!

● Don't be misled into thinking that one type of steam trap meets all requirements. Each type of trap has a purpose—operates efficiently only under certain conditions. The correct selection of the right type of trap for each application pays for itself by draining *all* condensate and venting *all* air in the *shortest* possible time.

ANDERSON STEAM TRAP SELECTION GUIDE

Super-Silvertop INVERTED BUCKET

For normal inside uses. More efficient since condensate, rather than temperature differentials, actuates the trap. Patented guided bucket arrangement eliminates bucket damage and assures positive seating.

Heat-Kwik COMBINATION BUCKET AND THERMOSTATIC

For extremely fast heating up. Unique combination design vents air eight times faster from cold units. Permits production units like cookers, dryers, autoclaves, kettles to reach maximum capacity in 2½ minutes.

Quik-Flex THERMOSTATIC

For all outdoor applications. Wherever a freeze-proof trap is required such as tracer lines, meter boxes, etc. Particularly recommended for refineries, chemical, petrochemical and other outdoor type plants.

Anderson FLOAT Traps

For continuous trapping. Such as ahead of condensate meters (bucket traps operate intermittently). Also for draining moisture and entrainment from *air* and *gas* pipelines, purifiers, separators and other equipment.

THE V. D. ANDERSON COMPANY

division of International Basic Economy Corporation • 1939 West 96th Street • Cleveland 2, Ohio, U. S. A.

YES I want to use the right steam trap. Please send information on the following types:

- ☐ Inverted bucket
- ☐ Combination
- ☐ Thermostatic
- ☐ Float

*Name*_____

*Company*_____

*Address*_____

*City*_____ *Zone*____ *State*_____

QUALITY STEAM TRAPS SINCE 1886

For more facts circle 602 on Reply Card

NEW PRODUCTS

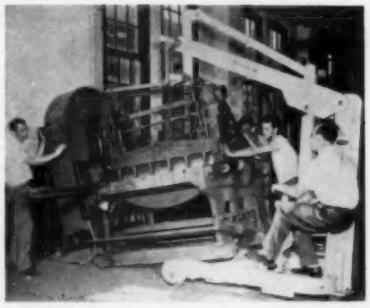
(Begins on page 172)

truded in an open cotton yarn jacket impregnated with graphite. It is also available in bulk form, 403S, for packing multi-size fittings and applications where need for rapid assembly prohibits use of a braided or extruded type material.

In cases where pure Teflon has been unsatisfactory because of cold flow, lack of resiliency or compressibility, 403 has shown excellent results, says manufacturer. It is designed for service from –150 to 500 F and for all applications (dynamic or static) requiring its chemical resistance qualities. This packing comes in ¼- to ¾-in. sizes on 10-ft. and larger spools. The bulk form is furnished in cans. Abbott and Biddle.

36—FORK TRUCK does heavy lifting and loading

Reported capable of a tremendous range of lifting, loading and hauling work, the Hydrauliphant weighs less and costs less than many comparable units. Its design eliminates much of the iron necessarily added to some types of fork trucks to counterweight the load. This reduced



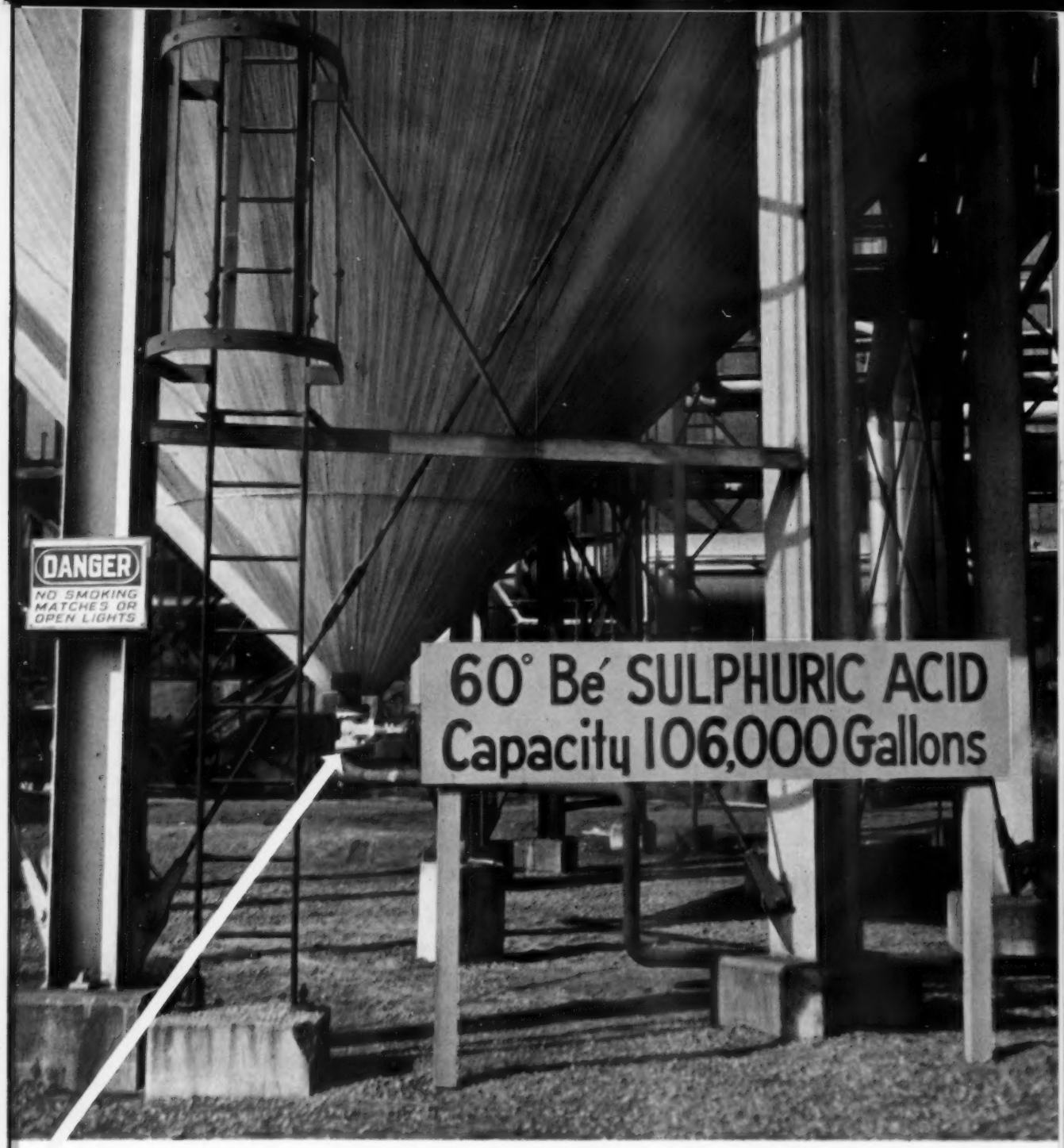
weight means that the Hydrauliphant (weighing less than 3000 lb) can work on elevators, upper floors and other weight-limited areas, manufacturer states.

Lifting operations are facilitated with this truck, it is pointed out, and almost any material from bulky machinery, bales, barrels, skids and pallets to long stacks of pipe, and steel sheets. The crane type load arm is designed to reach up to a 108-in. lift height with 100 per cent free lift. Narrow dimensions of the truck permit movement down narrow aisles. The Hydrauliphant is available in four models. All of them are electrically powered. Autoquip Corp.

37—CIRCUIT BREAKER is high-speed, 5 kv magnetic type

For use on 4.16-kv distribution systems, the Type 50-DHHS is announced as a 600-amp breaker with interrupting capacity of 30,000 amp (40,000 momentary), which can be applied where conventional 150-mva circuit breakers are now used. Moving parts are of lightweight, high-strength materials, it is noted, and roller bearings are used to reduce friction. Ac-

For more facts circle 603 on Reply Card ——→



Small valve takes on big job at U.S. Steel

That's a 4" Aloyco Gate Valve of Aloyco 20 stainless steel guarding the outlet of one of the largest acid tanks ever built.

It's one of the new units erected as part of United States Steel's modernization of the Coke and Coal Chemical Division facilities at Gary, Indiana. Aloyco valves are widely used here in both the Otto Construction Corporation's ammonium sulfate saturators and in the solvent recovery units which were engineered by United Engineers & Constructors, Inc.

They're also widely used by other leading manufacturers in the chemical processing and petroleum industries. Perhaps Aloyco valves could save you money in handling corrosives. Want more information? Write Alloy Steel Products Company, Inc., 1301 West Elizabeth Ave., Linden, New Jersey.

6.27

New... Built-in KLIXON PROTECTOR

Means You Get Maximum Work Output—Minimum Down Time from Your 3-PHASE Motors

Specify
and use motors
with Built-in
KLIXON PROTECTORS

BUILT-IN KLIXON AUTOMATIC PROTECTORS AND MANUAL RESET FOR 3-PHASE MOTORS

- Reduce Production Down Time
- Eliminate Motor Burnouts
- Minimize Motor Repairs and Replacements
- Assure Maximum Motor Capacity Under Any Conditions
- Simplify Motor Controls

PREVENT OVERHEATING CAUSED BY:

- **Prolonged overloads**
- **Single phasing**
- **Stalling**
- **Failure to start**
- **Lack of ventilation**
- **Increase in ambient temperature**
- **Plugging or reversing duty**
- **Unbalanced voltage**

Now you can count on the same maximum output under adverse conditions from your 3-phase motors as you've had for years from your Klixon-protected single phase motors. That's because motor manufacturers everywhere can supply standard 3-phase motors with Built-In Klixon Protectors.

You can get this protection built into your 3-phase motors from fractionals up through 7½ HP (600V) sizes.

Get the details from your district motor salesman, then specify and use motors with Klixon Inherent Protectors. The additional cost is low... the savings high... the advantages really worth while.

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Spencer Thermostat Division
4503 Forest Street, Attleboro, Mass.
KLIXON®

For more facts circle 604 on Reply Card

don't use floor space for your boiler room

VAPOR MODULATIC

WATER TUBE BOILER

you can put it on the roof— on a balcony—or hang it from the ceiling

PAY FOR YOUR STEAM THRU FLOOR SPACE SAVED!

OVER 13,000 SATISFIED USERS

produces up to 4 h.p. per sq. ft. of area

- Develops up to 27 H.P. per 1000# of weight.
- Produces up to .6 H.P. per *cubic ft.* of space used.
- Needs only 15" above top of boiler for maintenance. No additional floor space needed.
- Can produce 10% or more above ratings, continuously.
- Full ASME approved.
- It is a complete package unit.
- Proved by 25 years in America's toughest boiler rooms.

Write for complete specifications on the boiler that requires less space and permits lighter floor structure—The Vapor Modulatic.

VAPOR HEATING CORPORATION, 80 E. Jackson Blvd., Chicago 4

Dept. 18-C

Send me Modulatic Bulletin No. 586.

Name_____ Title_____

Company_____

Address_____

City_____ Zone_____ State_____

For more facts circle 605 on Reply Card

you get EXTRA STRENGTH with versatile

VERSATILE DURAGRIP SLINGS CAN BE USED IN THESE AND MANY OTHER ASSEMBLIES

2 leg bridle

3 leg bridle

4 leg bridle

It's easy to see why Wickwire's Duragrip Wire Rope Slings are becoming so popular throughout industry. They're properly designed and *they are extra safe because Duragrip Splices are used!* This means splices that have 100% of the strength of the rope from which they are made . . . splices that combine the advantages of hand splices and pressed fittings to give double assurance . . . splices free of protruding wire ends which can injure workers' hands.

What's more, there are other reasons why Wickwire Duragrip Slings are so dependable. They're always made from rope and fittings with matched rated capacities . . . made by a company which completely controls its sling production from iron ore through finished sling—your best assurance of the reliability that's so important to sling users.

Next time you need slings, check with your nearby, friendly Wickwire representative. He'll be glad to give you complete details on safe, versatile Duragrip Slings.

3831 A

thimble splice with hook — thimble splice

CF&I WICKWIRE WIRE ROPE SLINGS

PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION

THE COLORADO FUEL AND IRON CORPORATION—Denver • Houston • Odessa (Tex.) • Phoenix • Salt Lake City • Tulsa
PACIFIC COAST DIVISION—Los Angeles • Oakland • Portland • San Francisco • Seattle • Spokane
WICKWIRE SPENCER STEEL DIVISION—Boston • Buffalo • Chattanooga • Chicago • Detroit • Emienton (Pa.) • New Orleans
New York • Philadelphia CF&I OFFICES IN CANADA: Montreal • Toronto

For more facts circle 606 on Reply Card

NEW PRODUCTS

(Begins on page 172)

cording to company, these mechanical refinements combined with a high-speed trip device, permit a contact parting time of only ¾ cycle after energizing the trip coil. Closing current for the new breaker is approximately 90 amp and the trip current is 25 amp, it is noted, and standard overcurrent relays or high-speed relays can be used to trip the breaker. Westinghouse Electric Corp.

38—CELL FILLER controls battery electrolyte level

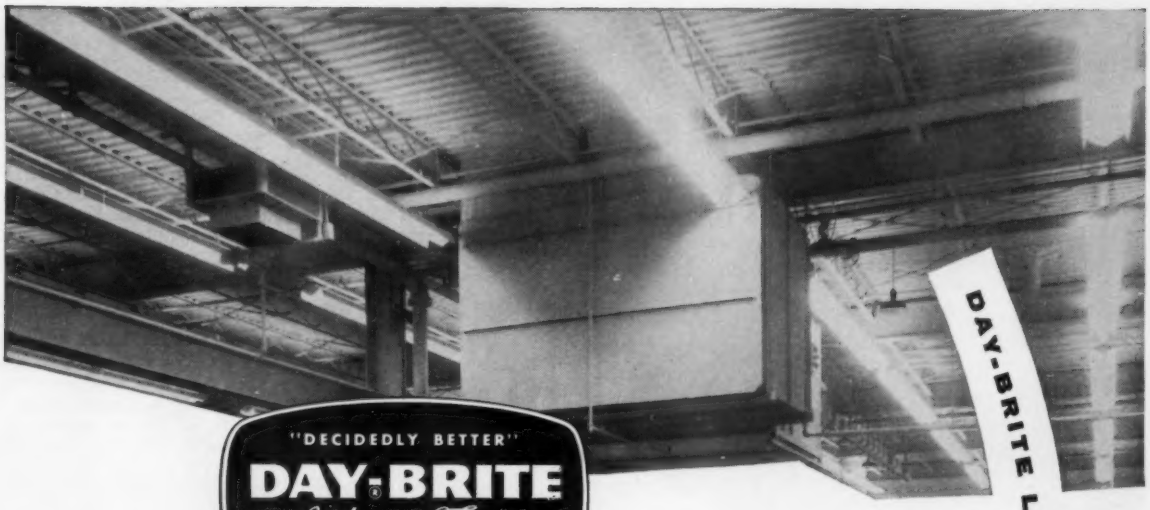
Developed especially for railway service, Rite-Hite is now available to industrial plants. This cell filler controls electrolyte level in batteries by adding water to the correct height without overflushing. Rite-Hite comes in five models—three horizontal and two vertical—the 15-in. hori-

zontal and 9-in. vertical fillers being best adapted to industrial truck use.

The filler, connected to a water supply of 20- to 50-psi pressure, consists of a tube and a hydrostatic means of controlling flow. With the end of the tube inserted in the cell opening to the proper depth, as determined by a stop on the tube, water flow is turned on by a lever that operates a spring valve. As soon as the electrolyte level covers the tube end, a partial vacuum within a small copper tube running inside the water tube builds up and causes a diaphragm within the housing to release the spring valve and stop the water flow. Maintenance of the Rite-Hite is declared simple—it has few moving parts. In cold areas, it should be drained of water when not in use. Gould-National Batteries, Inc.

39—INSULATING UNIONS to stop electrolytic corrosion

Insulating forged steel unions, used to prevent electrolytic corrosion due to flow of electric current along pipe lines, are offered in 3000-lb class, sizes ¼ to 3 in. in screw-end and socket welding types. The tailpiece, thread piece and nut are drop forged from carbon steel, and the insulating sleeve, separating tailpiece and



"DECIDEDLY BETTER"

DAY-BRITE

Lighting Fixtures

DAY-BRITE LIGHTING MAKES THE BIG DIFFERENCE HERE

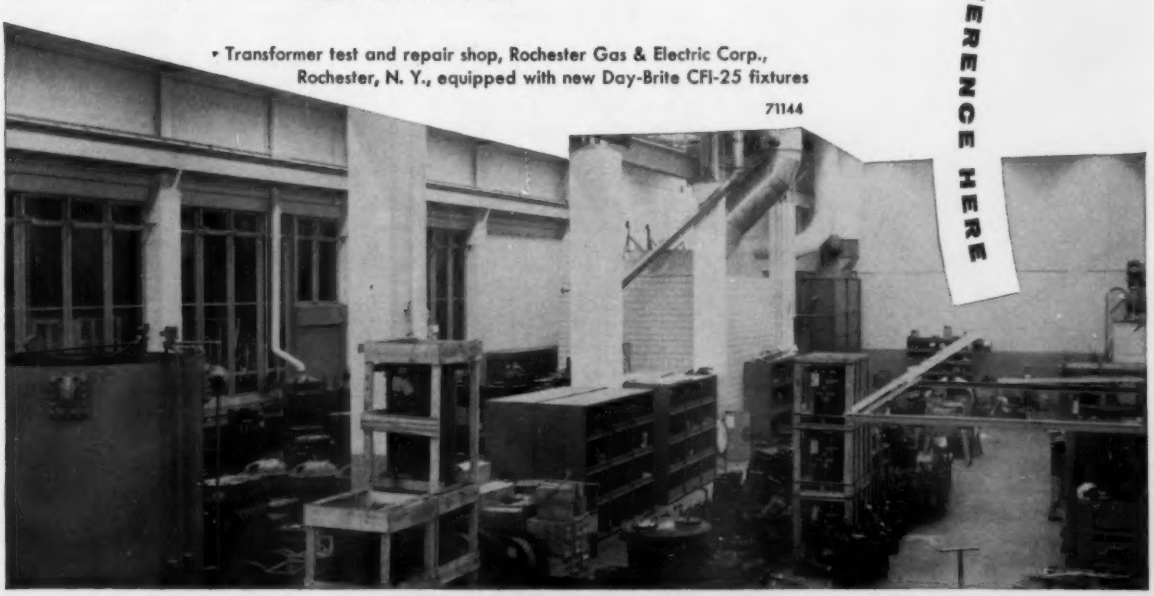
Lower costs with new high-output CFI

Equipped with new high-output, rapid-start lamps, the new Day-Brite CFI (Comfort For Industry) fixtures provide a high level of over-all illumination at lower over-all cost.

The new CFI fixtures are designed with slotted openings in the reflector tops which direct a portion of the light to the ceiling and permit natural updraft ventilation. Maintenance is reduced because reflectors and lamps stay cleaner longer—resulting in extra light at no extra cost. Also, eyestrain and fatigue are minimized because harsh ceiling contrasts are washed out.

For the newest idea in industrial lighting, consult your Day-Brite representative. He's listed in the Yellow Pages. Send for new CFI literature. *Day-Brite Lighting, Inc., 5439 Bulwer Ave., St. Louis 7, Mo.*

NATION'S LARGEST MANUFACTURER
OF COMMERCIAL AND INDUSTRIAL
LIGHTING FIXTURES



• Transformer test and repair shop, Rochester Gas & Electric Corp., Rochester, N. Y., equipped with new Day-Brite CFI-25 fixtures

71144

For more facts circle 607 on Reply Card

this is what it takes
to give you

dependable air...

Packaged Air-Cooled Compressors—
½ through 20 horsepower
Other Compressors to 6000 Horsepower

You can't minimize the importance of a reliable source of compressed air.

Ingersoll-Rand Compressors are designed and built for maximum performance with minimum maintenance.

If your plant is in need of an air-cooled compressor in the ½ through 20 horsepower range . . . don't gamble, make sure you get the *Best.*

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3-494

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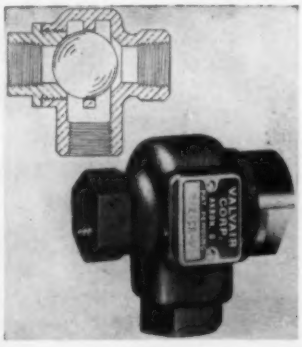
NEW PRODUCTS

(Begins on page 172)

nut, is made of fabric-reinforced phenolic resin for high strength, toughness and chemical resistance. The gasket which seals the union joint, and which is in contact with the fluid in the pipe, is made of Teflon. W-S Fittings Div., H. K. Porter Co., Inc.

40—DIRECTIONAL VALVE has instant switch-over

This directional valve is designed to afford instant switch-over from automatic to manual control of diaphragm-operated valves, cylinders and similar devices. Installed as a tee in the inlet lines, the valve



permits manual take-over from automatic control, or control from two different sources, when desired, it is stated. It can also be used to prevent inter-mixing of supply when two gases or liquids are being delivered alternately to a tank or container. Automatic in operation, this directional valve can be substituted for a dual top valve, manufacturer says.

The valve is simple in design, consisting of a captive Hycar ball which shuttles between two seats in the bronze valve body. When pressure is applied to one port, the ball shifts to, and seals, the opposite port. For use with air, oil, water or media compatible with Hycar and bronze, this valve is available with ¼ and ⅜ NPT ports. Valvair Corp.

41—ILLUMINATOR sheds more light on level gages

Model EPL-56 Illuminator is reported to give up to three times the illumination and bulb life of many illuminators for liquid level gages. It lights up the entire gage glass length with a bright, evenly diffused light, company states, so the liquid level can be seen clearly under all conditions. The new model offers features common to this manufacturer's line, including easy mounting on the back of transparent gages, and incorporation of the solid wedge principle of lighting in which illumination from a single bulb is reflected from the angular surface of the plastic wedge and evenly diffused through the transparent gage glass. This plastic wedge is mounted with air-cooling space between it and the gage glass, which

MICRO SWITCH . . . FIRST IN PRECISION SWITCHING

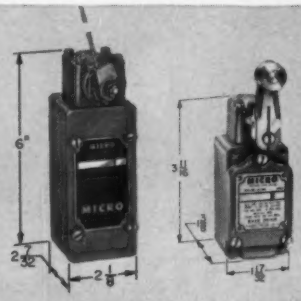
How plant operators use MICRO SWITCH Precision Switches to speed materials handling

Plant engineers find MICRO SWITCH precision switches ideal for keeping production lines running smoothly.

Small in size, high in electrical capacity, versatile in application, these switches may be used everywhere —in process, bulk, flow and level controls; on package and part conveyors; in counting and weighing devices; as manual push-button controls; and to automatically control mechanical motion of machines and equipment.

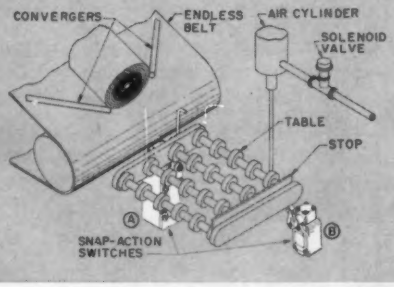
Here are two practical examples of the way these switches have been used to speed materials handling:

Automatically unload tied bundles

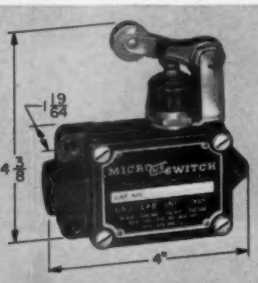


Two MICRO SWITCH precision switches, of different types, unload tied bundles from this conveyor. They also prevent bundles from piling up at the end of the conveyor.

Bundles, which come from the floor above, are centered by two convergers. Each bundle actuates Switch A (with long feeler) as it passes on to the ball bearing table. The switch operates a timing device which stops the conveyor and operates a solenoid air cylinder. This tilts the table, dropping the bundle into a hand truck below. When the table returns to normal position, it actuates small limit Switch B which starts the conveyor again.



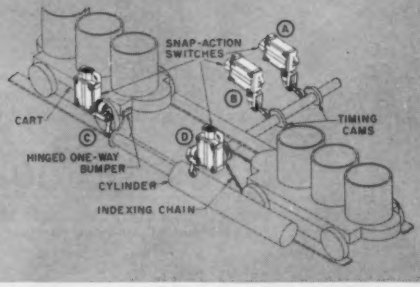
Four switches position moving carts on conveyors



On the forward stroke of a hydraulic cylinder ram the carts are moved forward by a hinged one-way bumper.

The switch circuit ties the hydraulic cycle in with the mechanical timing cycle and prevents the next loading operation until the cylinder ram has moved the preceding carts ahead on the conveyor.

Switch C closes on the forward stroke of the ram. A timing cam closes Switch A. This reverses the hydraulic ram to the back position where it closes Switch D. When Switch B is closed by the timing cam, the ram again moves out and pushes the carts forward on the conveyor.



There is a MICRO SWITCH Distributor near you with complete stocks of switches for plant use applications. Look under "Switches, Electric" in your classified telephone directory.

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A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY
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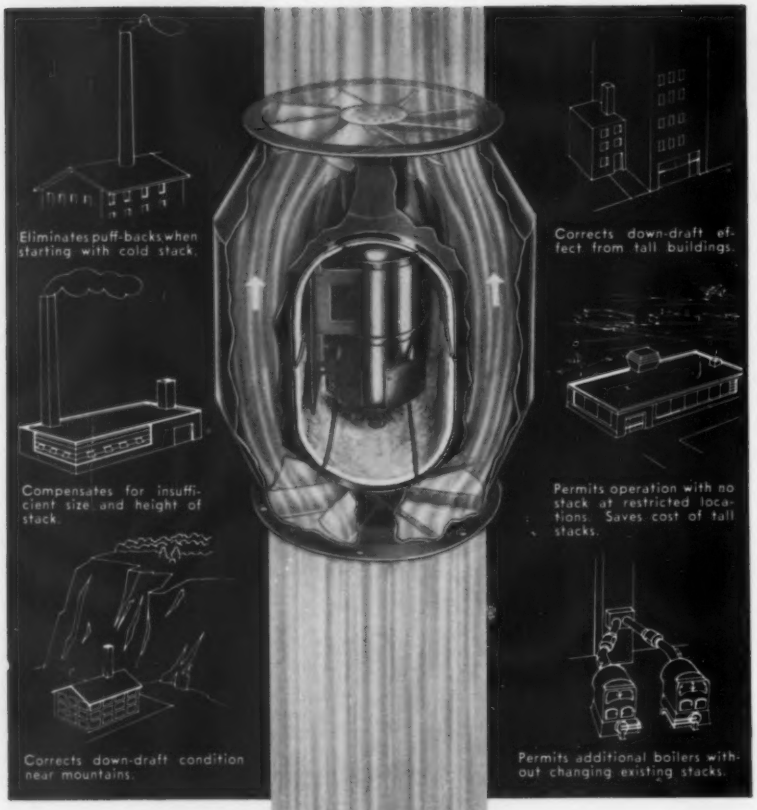
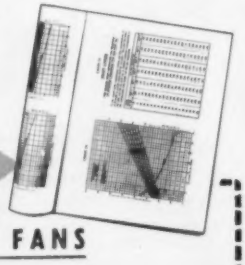

Eliminates puff-backs when starting with cold stack.
Corrects down-draft effect from tall buildings.
Compensates for insufficient size and height of stack.
Permits operation with no stack at restricted locations. Saves cost of tall stacks.
Corrects down-draft condition near mountains.
Permits additional boilers without changing existing stacks.

Solve these 6 problems with INDUCED DRAFT BIFURCATORS®

Regardless of the problems posed by weather or surrpunding conditions, the Induced Draft Bifurcator provides *instant* draft . . . and maintains *constant* draft at the required rate of flow of flue gas through your boiler system.



NEW Bulletin Mail Coupon

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Division of American Machine and Metals, Inc.
East Moline, Illinois

Please send free 20-page bulletin, containing a section "How to select an Induced Draft Bifurcator."

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ATTENTION MR.

For more facts circle 610 on Reply Card

NEW PRODUCTS

(Begins on page 172)

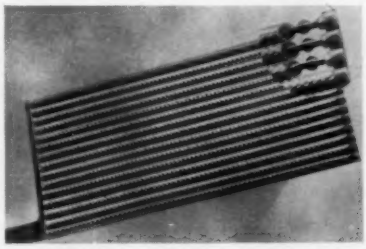
allows the illuminator to be used on higher temperature gages. The illuminator is announced as explosion proof and UL approved, and as easily relamped. Jerguson Gage & Valve Co.

One of these products may be "just what you're looking for." Use the handy Reader Service Cards to ask for more information on it.

42—TRUCK BATTERIES offer more power, same size

Use of a new armored porous tubing to encase the Silvium grid spines and active material of the positive plates has enabled this company to concentrate more power into the same battery cube space in the TG Exide-Ironclad Battery. Manufacturer says it has the highest ampere-hour per cubic-inch rating among motive power batteries, making it the lowest cost battery to own and operate. It has a rated capacity of 72 amp-hr per positive plate; company's TLM Exide-Ironclad now in use, has a 50 amp-hr rating.

According to manufacturer, the new tubing material is highly permeable to



diffusion of electrolyte and the passage of current, acting like an efficient cigaret filter and facilitating electrochemical action. The battery with this tubing is declared particularly effective at high discharge rates. The tubing is said to prevent practically any loss or shedding of active material—although porosity is high, the minute openings are such that virtually no particles can work through. The tubing material is claimed impervious to electrochemical action with the battery, and highly resistant to acid attack. Exide Industrial Div., The Electric Storage Battery Co.

43—MARKING PAINT shows hydrogen embrittlement

Tempa-Dot is reported to tell the tale on hydrogen embrittlement hazard. This "time and temperature" indicating paint has been developed for application to heat treated parts that have been electroplated, pickled or phosphate treated to show that

Speeds through brittle fibre pipe slick as a whistle!

Rugged B&D Heavy-Duty Jig Saw zips through jobs!

POWER-BUILT design to make your installations easier!

Designed for the toughest jobs, the versatile Black & Decker Heavy-Duty Jig Saw is powered to save you muscle and manhours. Combines a sabre, rip, crosscut, coping, hand, hack and keyhole saw in one hand-fitting tool. Makes curved, straight or irregular cuts—pocket cuts in floors, baseboards and panels. Full 1″ stroke . . . cuts to a 45° angle on either side.

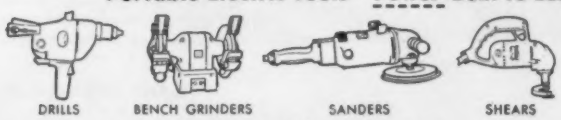
Heavy-Duty, B&D-built motor won't stall, runs cool, without vibration. Heavy-duty shoe won't wobble or distort. See your B&D distributor for a free demonstration—you'll wonder how you ever did without one! Or, for full details, write: THE BLACK & DECKER MFG. CO., Dept. 1503, Towson 4, Maryland. (In Canada: 80-86 Fleet St., E., Toronto 2, Ontario.)

Look Under "TOOLS-ELECTRIC" in Yellow Pages

Leading Distributors Everywhere Sell

Black & Decker®

Portable Electric Tools—Power-Built to Last



DRILLS BENCH GRINDERS SANDERS SHEARS

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Slices through sheet metal like a knife through butter!

Cuts neat, clean holes in wood: 1″ hardwood; 2″ in soft.

Makes pocket - cuts quickly and easily.

Cutting pass-through holes in ceilings is a cinch!

OVER 50 YEARS of Engineering and Manufacturing Experience

make MATHEWS CONVEYERS your best buy

A system of roller and belt conveyer handling incoming and outgoing merchandise in a modern mail order depot.

It was over 50 years ago that the first Mathews Conveyers were designed and built—and from that early equipment has come the development of the Mathews **continuous flow** conveying systems of today. In these 50 years Mathews engineers have developed a complete line of gravity and power conveyers and special conveying machinery to serve nearly every class of industry in the United States and Canada. Whatever is required in the way of modern conveying machinery, you'll find that Mathews has it, and that Mathews Conveyers are your best buy.

MATHEWS CONVEYER COMPANY . . . ELLWOOD CITY, PENNA.
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MATHEWS
Fifty Years of Leadership in Mechanized Handling

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NEW PRODUCTS

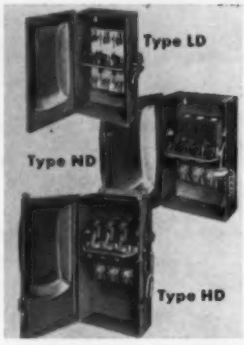
(Begins on page 172)

each part has been baked to relieve hydrogen embrittlement. Tempa-Dot appears a vivid red dot before baking and changes color after the proper bake. Its color reaction is claimed so accurate as to tattletale a ± 25 F deviation. Tempa-Dot comes in a spot applicator tube, costs under $8.00 for six. Ever-Lube Corp.

44—SAFETY SWITCHES meet new NEMA standards

Three types are included in a line of safety switches recently announced as meeting the new NEMA specifications: Type LD is for light duty and replaces former D and G types. This line covers a range from 30 to 200 amp in general purposes and rain-tight enclosures. NEC horsepower ratings are included.

Type ND, for normal duty and commercial work, replaces former H, S, A

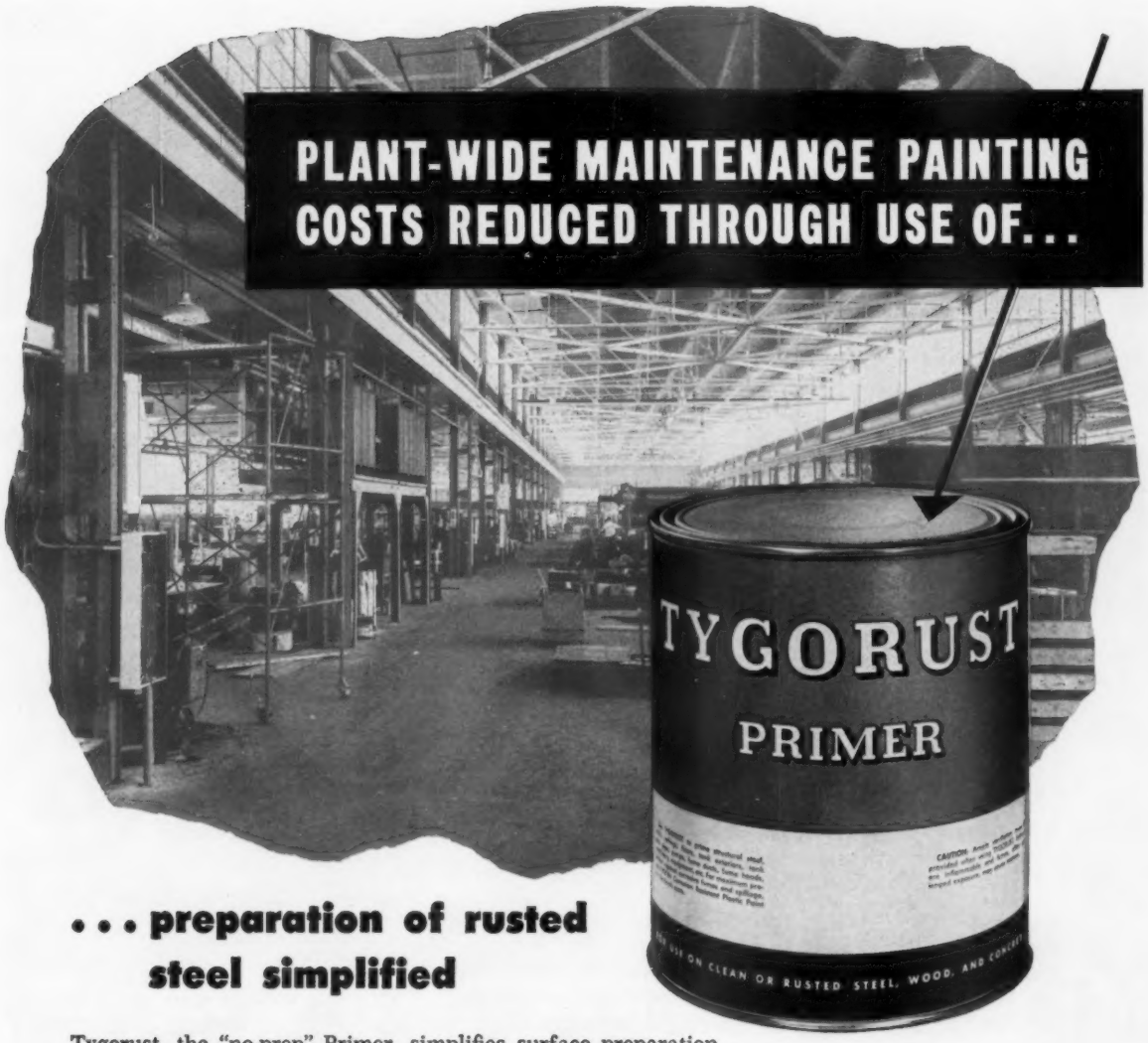


or C designations. The line extends from 30 through 1200 amp in 250 and 600 v, a-c and d-c, in general purpose or rain-tight enclosures. Both NEC and dual element horsepower ratings are included. This company's Type ND switches include a quick-make, quick-break operating mechanism, independent of handle, and silver plated current carrying parts. These switches are reported to exceed UL endurance standards. Type HD, for heavy duty industry use, is a premium performance switch. Enclosures include gasketed industrial (NEMA 12) as well as water-tight and dust-tight, and explosion-resisting types. It is claimed to exceed requirements as to safety and endurance, has heavy electroplated silver on all current carrying parts, and interchangeable lugs. The Square D Co.

45—FLOOR MACHINE for use in hazardous industries

For safe maintenance of floors in powder factories, atomic research plants, oil refineries and other hazardous industries, the explosion-proof Commander Floor Machine is available with 16- and 20-in. brushes. Wiring from motor to handle is eliminated by mounting electric switch on motor housing, but start-and-stop control is retained on handle. Manufacturer says the entire unit is constructed, safety-

PLANT-WIDE MAINTENANCE PAINTING COSTS REDUCED THROUGH USE OF...



. . . preparation of rusted steel simplified

Tygorust, the "no-prep" Primer, simplifies surface preparation in dozens of applications throughout the average plant contributing substantial savings in time and labor. Sandblasting rusted steel, for example — or drying out damp concrete . . . these operations, formerly considered essential before priming could be started, are no longer necessary. In most cases rusty steel need only be wire brushed before priming with Tygorust. Old concrete, damp or dry, may be Tygorust-primed after simply brushing off dirt and loose particles.

Tygorust Primer can be brushed or sprayed and gives economical coverage. It may be applied over firmly adhering old paints (excepting bituminous coatings), and provides excellent adhesion for any type of finish including vinyl-base coatings. Tygorust stops underfilm rust-creep and, through superior adhesion properties, aids in maintaining paint films in top condition. Try Tygorust as a general purpose primer . . . and start a new cost sheet, because Tygorust is one logical method of keeping maintenance painting costs down.

432-E-

PLASTICS AND SYNTHETICS DIVISION

U. S. STONEWARE

AKRON 9, OHIO

HELPFUL HINTS ON MAINTENANCE PAINTING

are contained in THE TYGON PAINTING MANUAL. Its thirty pages cover virtually all aspects, from surface preparation to tips on equipment.

Send for your free copy today

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NEW

METER WITH A MEMORY...

NEPTUNE REPEATING AUTO-STOP

Set it once... delivers same quantity of liquid batch after batch

You batch faster, free operator's time for other duties, and prevent setting errors with this *repeating* Auto-Stop meter. Set the quantity required by the formula just once, simply by pressing buttons. Then open the valve and the meter does the rest. It shuts off automatically at the exact amount. The meter "remembers"... delivers the same amount each time the valve is opened until reset for a different quantity.

Neptune meters end spoiled batches, overfilling, spillage and slow weighing. No more buckets or gauge sticks. Meters are safer, too. Hazardous liquids stay inside the pipe.

You can now meter hundreds of liquids... hot and cold water, syrups, oils, solvents, soap solutions and many chemicals. Auto-Stop meter capacities 5 to 300 gpm. Other Neptune features include ticket-printing registers and electrical Auto-Switch (shown above) to control pumps, valves or signals. Neptune Meters with simple counters or dials also available from ⅝ to 6 in. Ask for free technical metering Bulletin 566-OPE.

NEPTUNE METER COMPANY

19 West 50th Street, New York 20, N. Y.

neptune liquid METERS

Branches in: ATLANTA · BOSTON · CHICAGO · DALLAS · DENVER · LOS ANGELES · LOUISVILLE · No. KANSAS CITY, Mo. · PHILADELPHIA · PORTLAND, ORE. · SAN FRANCISCO (Millbrae) · IN CANADA: TORONTO 14, ONT.

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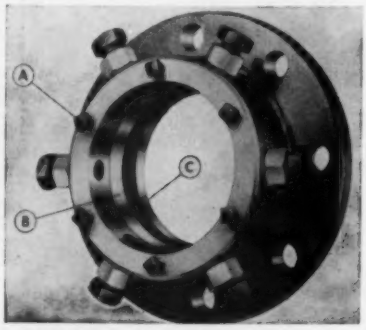
NEW PRODUCTS

(Begins on page 172)

tested and sealed to prevent sparks and static that might ignite explosive gas, dust, fumes or vapors. Static eliminator wire in brush, company states, prevents shock to operator. Dual handles are designed to spread the load, eliminate effects of torque and give operator better control. Gear unit is grease-sealed for life. Instant-change attachments enable user of this all-purpose machine to handle many jobs other than polishing. Holt Mfg. Co.

46—PIPE FITTING has hundreds of applications

The Plidco-Flange shown is of the non-welded type and ready to install. It is equipped with nuts and washers on clamping screws for service where vibration conditions are severe. This fitting is also furnished in a welding type. When end thrust screws (A) are tightened, the

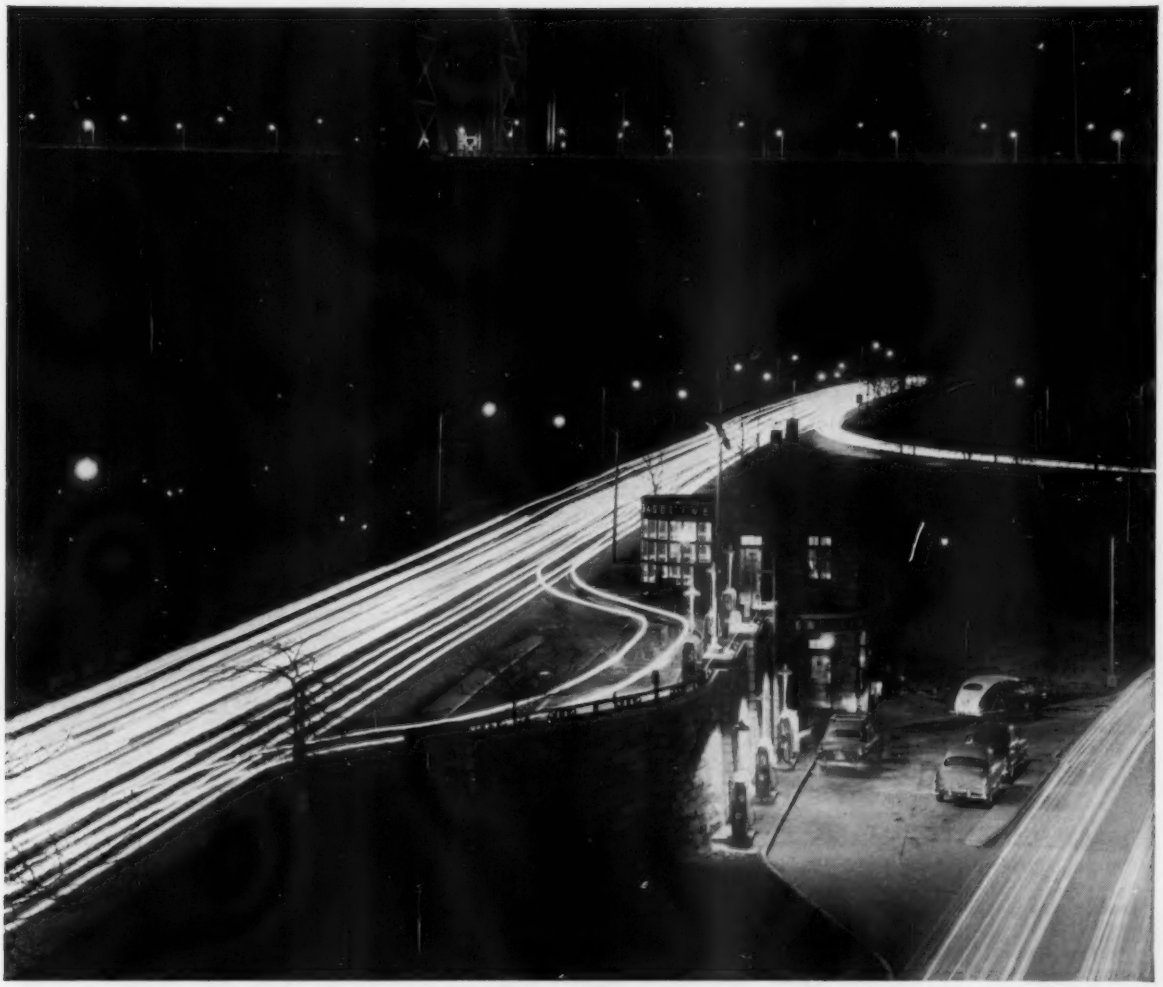


steel thrust ring (B) moves forward to squeeze packing ring (C) out between pipe walls. The result is claimed to be a seal that withstands several hundred pounds per square inch of pressure. Plidco-Flanges may be bolted in place for future removal or welded permanently. They slip over the end of pipes, seal off and mate up with standard flange facings, it is noted; welding may then be performed while pumping.

For blind plate flanges, you simply slide the Plidco-Flange back, remove or install blind plate, re-set the Plidco-Flange and the blind plate is changed. The ease of installing Plidco-Flanges is advantageous in situations involving high overhead piping, conduits and tunnels, and in tight manifolds and hazardous locations, company points out. The fittings come in sizes 2 through 12 in. with 150-lb ASA standard steel flanges. The Pipe Line Development Co.

47—ADHESIVE TAPE can stand high temperatures

This is announced as a fiber glass tape with a new non-organic pressure-sensitive adhesive which keeps its bond in temperatures to 550 F. It is also reported to perform well at low temperatures—to have been tested at —100 F and actually applied at —20 F. According to manufacturer, this tape has superior electrical



You already depend on a Leland explosion-proof!

7 of every 10 gasoline pumps are powered by Leland

Next time you have your gas tank filled – quickly and safely, whatever the weather – odds are *better than 2 to 1* that a *Leland* motor will pump the gasoline.

For ever since Leland introduced the *first* explosion-proof gasoline pump motor, over 30 years ago, Leland gas pump motors have *outsold all others combined!*

Odds are you'll find Leland your finest source for explosion-proof motors of *all* kinds – from pumping volatile liquids and gases to powering equipment in hazardous atmospheres. There's a complete line of explosion-proof motors from ⅙ to 5 hp – and, if necessary, the experienced engineering ability to *develop* an explosion-proof motor to meet your most demanding requirements.

Next time you need a motor, standard *or* special, explosion-proof or otherwise, try Leland.

Leland explosion-proof gasoline pump motor, Underwriters' Approved for Class 1, Group D. Capacitor start, induction run, with built-in voltage changer and on-off switch.

Another AMF Product

LELAND MOTORS

THE LELAND ELECTRIC COMPANY
Dayton 1, Ohio
Division of AMERICAN MACHINE & FOUNDRY COMPANY

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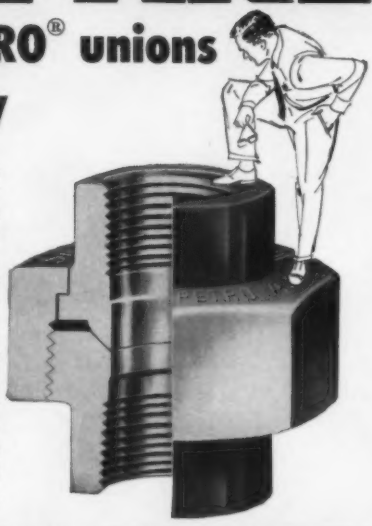
COMPARE

Clayton Mark PETRO® unions are your best buy



Next time you buy forged steel unions, remember to make this important comparison check! Be sure that you get the unions that have *all 16* of these quality points, to assure pressure-tightness, ease of installing, interchangeability, and re-useability. Be sure that you get Clayton Mark *Petro*®—made by the originators of steel unions!

Write—today—for your copy of "How to Tell a Good Union." It describes the importance of the 16 points . . . tells how they add up to better service and complete satisfaction. Order Clayton Mark unions from your distributor; 3000 and 6000-lb. screwed and socket weld types, ⅛" to 3" pipe sizes.

MAKE THIS COMPARISON CHECK BEFORE YOU BUY UNIONS

QUALITY POINT	Petro	BRAND A	BRAND B	BRAND C	BRAND D	BRAND E	BRAND F
Made to AAR standard design	●		●	●		●	
Hardness differential between seats	●	●				●	
Cold-rolled female seat	●					●	
45° cone-to-ball seat	●	●	●	●		●	
Cadmium-plated nut	●		●			●	
Ends taper-reamed before threading	●		●		●	●	
Published steel specifications	●				●		
Each union individually tested	●						
Induction-heated for forging	●						
Hot-forged	●		●	●	●	●	●
Octagon wrench flats on ends	●		●	●	●	●	
Octagon wrench flats on nut	●	●	●	●	●	●	
Rounded nut and end wrench flats	●		●		●	●	
Turbulence-free fit across seats	●		●	●		●	●
Machined surfaces finished to "#40 turn" or finer	●	●			●		●
All sharp corners relieved	●	●					

CLAYTON MARK

CLAYTON MARK & COMPANY
1900 Dempster Street
Evanston, Illinois

For more facts circle 616 on Reply Card

NEW PRODUCTS

(Begins on page 172)

properties and rates as a Class H insulation; it maintains stability in presence of most acids and lubricating oils; and its adherence shows no corrosion or stain on paper, glass, brass, copper, steel, aluminum or cloth. The tape comes in ¼- to 2-in. widths, may be printed in up to three colors. Samples offered. Topflight Corp.

48—POWER HAND TOOL is faster, more powerful

Among features reported for the Hi-Torque Handee, Series 6000, are extra speed and power, streamlined design, larger air vents for cooler operation,

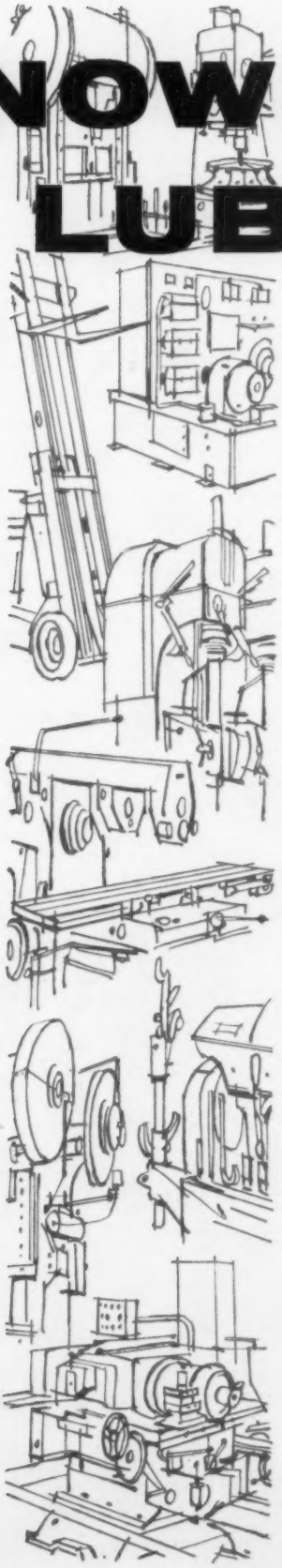
larger Oilite bearings, and a new built-in chuck lock for quick change of accessories. The new Hi-Torque Handee was developed for use as a complete hand workshop for machine shops, tool and die rooms, foundries, other facilities. It weighs 14 oz, and operates at 25,000 rpm for grinding, cutting, carving, drilling, sanding, sawing, engraving, polishing, cleaning and burnishing. The tool works in wood, hardened steel, non-ferrous metals, glass, ceramics and plastics. It is available for operation at 110 or 220 v, 25 to 60 cycles a-c or d-c and has a set of all-purpose accessories and case. Chicago Wheel and Mfg. Co.

49—TRAP gets condensate out of compressed air and gas

System-power action is featured by the Mag-Pneu-Power Trap, which discharges condensate from compressed air or gas lines by a combination of magnetic, pneumatic and automatic action. As condensate in the trap rises, the float does not rise, company explains, but is held in place by the magnet on the pivot arm. When the force build-up of the condensate working on the float overcomes the magnetic attraction, the float "snaps" open the pilot valve. Air enters the pilot valve, flows down the stem, and up under the piston, forcing piston assembly upward. As this occurs, it opens the main discharge valve. Condensate is forced into this valve by the system pressure, and out into the discharge outlet.

When sufficient condensate has been

NOW! ATLANTIC LUBRICANT 54



. . . the one lubricant for practically every industrial need

New Atlantic Lubricant 54 is industry's closest approach to the universal grease lubricant. The use of this distinctively purple grease in your plant practically assures the correct choice in any application. It has given outstanding performance in all types of machinery.

Every shop, large or small, can make economical use of Atlantic Lubricant 54 because it gives

- . . . multiplicity of use—reduces chance for error, cost of warehousing, and handling
- . . . outstanding rust protection—protects ferrous surfaces under wet conditions
- . . . excellent lubrication performance from very low to extremely high temperatures
- . . . unusual stability against oxidation and softening under rugged working conditions
- . . . positive identification due to its purple color

This product is available from warehouses conveniently located throughout Atlantic's marketing territory and may be ordered through the nearest office listed below.

ATLANTIC

LUBRICANTS • WAXES
PROCESS PRODUCTS

PHILADELPHIA, PA.
260 So. Broad St.

PITTSBURGH, PA.
Chamber of Commerce Building

PROVIDENCE, R. I.
430 Hospital Trust Building

SYRACUSE, N. Y.
Salina and Genesee Streets

READING, PA.
First and Penn Avenues

CHARLOTTE, N. C.
1112 South Boulevard

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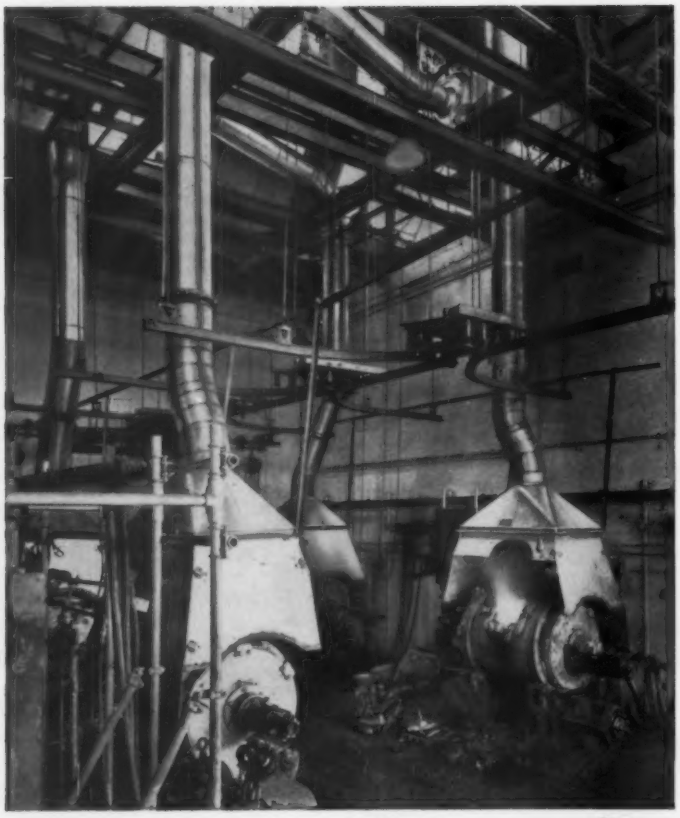


System ON

Operating Costs... Cut ½

FUME CONTROL SYSTEMS by KIRK & BLUM
at the William Powell Company, Cincinnati Valve Manufacturers

Twelve electric furnaces in the nonferrous foundry of this noted valve manufacturer are individually exhausted by just six fans. Fan-driven exhaust from one hood is injected into a venturi in the piping from another hood.

System OFF

In metals melting operations, uncontrolled smoke, fumes and gases are a toxic nuisance. At the William Powell Company, "Clean Air . . . the Invisible Tool," as applied by KIRK & BLUM Engineers, controls this condition.

In addition, KIRK & BLUM Engineers, by utilizing the injector principle, reduced initial and operating costs, also halved maintenance—since each fan provides individual exhaust for two furnaces.

Although a "home-grown" system may be low in first cost, its savings fade when compared to the efficiency, lower maintenance and operating costs of a correctly designed, fabricated and installed system. Put your dust or fume problems up to experts.

For further details and illustrated booklet, write today to:

KIRK & BLUM
3189 FORRER STREET
CINCINNATI 9, OHIO

FUME CONTROL SYSTEMS
For more facts circle 618 on Reply Card

NEW PRODUCTS

(Begins on page 172)

discharged, the float drops and magnetic attraction to the float arm causes the snap closing of pilot valve. When this valve snaps shut, the air supply to the piston is cut off. Air in the piston chamber bleeds through a minute orifice, the piston returns to its original position, closing the main discharge valve. The piston mechanism is sealed off from the condensate to prevent damage or clogging. Pressure range of the trap is from 10 to 200 psig. Details of the trap are in Bulletin 501. Hankison Corp.

Use the Reader Service Cards provided on pages 257-258 to ask for more information on these products. Circle item numbers of products in which you are interested.

50—LUBRICATOR clamps on to original container

This air-motor operated lubricant pump incorporates a steel cover which can be clamped to any standard 25- to 50-lb original refinery container. Pump assembly includes handle. Manufacturer states pump will develop grease pressure 50 times greater than air line pressure. It is reported to dispense all pressure gun lubricants in any weather, and includes follower plate for positive prime. The lubricator comes equipped with 6-ft high pressure hose and control valve with curved extension for contacting hard-to-reach fittings. Bulletin 727 gives more details. Lincoln Engineering Co.

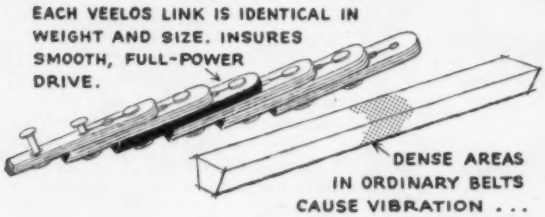
51—ALUMINUM ALLOY offers ease of solderability

Developed to eliminate many problems associated with smooth and economical soldering of heat-exchanging equipment, is a zinc-clad aluminum alloy now available in commercial quantities. Fabricated with one or both sides clad, and in coil or flat sheet form, Alcoa Soldering Sheet is claimed to bring aluminum within range of the ease of solderability heretofore enjoyed by copper. Used with special soldering techniques, zinc-clad aluminum is expected to simplify normal maintenance and repair problems of soldered assemblies, in addition to reducing costs of production. Aluminum Co. of America.

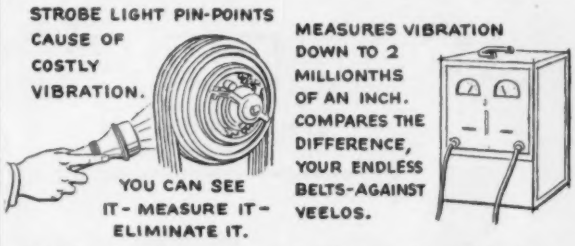
52—CONTACT BURNISHER has longer basic element

The No. 162 is a 3-in. contact burnisher with slim-grip handle, for use where relay contacts are almost completely hidden and hard to reach. It is announced as an accessory for company's pen-type contact burnisher. Improvements include a longer basic element in burnisher it-

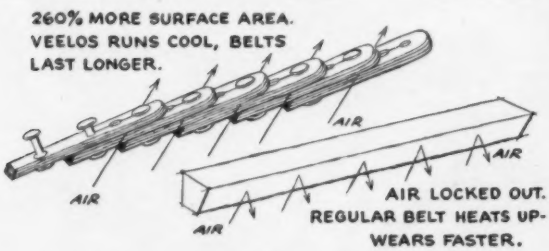
Six Reasons Why Veelos Adjustable V-Belts Are Better For Your Drives!


EACH VEELOS LINK IS IDENTICAL IN WEIGHT AND SIZE. INSURES SMOOTH, FULL-POWER DRIVE.
DENSE AREAS IN ORDINARY BELTS CAUSE VIBRATION . . . MACHINE WEAR

1. Balanced construction of Veelos Belts assures you faster, cleaner work, less rejects . . . less bearing wear. Each link and stud is identical in size and weight. Ordinary belts have varying spots of density which cause excess vibration—chatter marks, machine wear.


STROBE LIGHT PIN-POINTS CAUSE OF COSTLY VIBRATION.
YOU CAN SEE IT - MEASURE IT - ELIMINATE IT.
MEASURES VIBRATION DOWN TO 2 MILLIONTHS OF AN INCH. COMPARES THE DIFFERENCE, YOUR ENDLESS BELTS-AGAINST VEELOS.

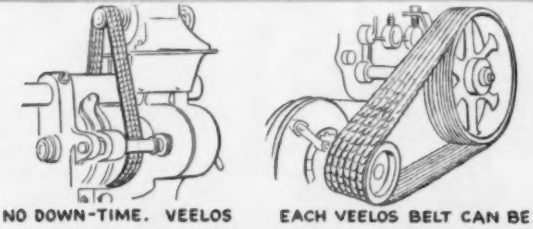
2. Electronic proof—up to 90% less vibration! With a vibration analyzer, you see, on your own machine, how Veelos belts decrease vibration up to 90% over any belt you're now using. This amazing Veelos test pin-points the belt that has the "invisible shakes."



3. Cooler running—long life! Veelos breathes! Constant circulation of air keeps Veelos running smooth. Regular V-belts have no chance to cool, heat builds up from the inside . . . causes slippage, wastes power, heats bearings, reduces belt life.

AREA CONTACT
POINT CONTACT
PERFECT VEELOS FIT. EXTRA THICKNESS AND MACHINE-CUT SIDES PREVENT BOTTOMING. MEAN CONSTANT POWER.
POWERLESS POINT CONTACT OF ORDINARY V-BELT. BULGES, SLIPS, CAUSES UNEVEN SHEAVE WEAR.

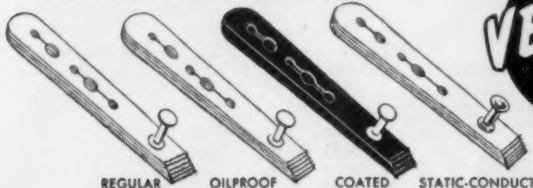
4. Greater flexibility reduces slippage! Sectional construction, beveled links allow greater flexibility, longer belt life. Each link moves around sheave independently and maintains full contact, constantly. Full area contact allows shorter centers, smaller sheaves.


NO DOWN-TIME. VEELOS FITS ANY DRIVE - WITHOUT DISMANTLING.
EACH VEELOS BELT CAN BE ADJUSTED - NO NEED FOR EXPENSIVE MATCHED SETS.

5. Simple installation "knocks out" down-time! Saves up to 50% installation time on outboard bearing drives, more when belt length isn't in stock. No resetting, tilting or moving motors. Veelos can be made any length, can be changed by adding or removing links.

6. Veelos won't stretch any more than ordinary endless V-belts when it is properly installed. *Remember—measure Veelos 1" short per foot and roll on drive as tightly as possible.* With the first few revolutions Veelos studs accept a permanent set into the sections they connect.

4 TYPES — FOR ALL DRIVES


REGULAR For general service
OILPROOF For oily and hot drives
COATED For wet or oily drives
STATIC-CONDUCTING For explosive atmosphere

VEELOS
THE BALANCED LINK V-BELT
Known as Veelink outside U.S.A.

Write for free Veelos Data Book or Veelos Vibration Demonstration to:

MANHEIM
Manufacturing & Belting Co.
404 Stiegel St., Manheim, Pa.

"Industrial Belt Specialists Since 1911"

For all sizes and types of drives. Double-V available for serpentine drives.

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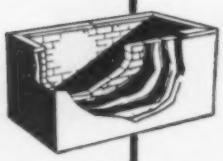
plant wide protection from corrosion

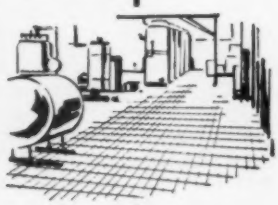
TANKS



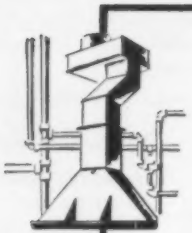
all types of pickling, plating, chemical processing, storage and other tanks containing corrosive chemicals are constructed of Atlas materials.

FLOORS

industrial floors are designed to resist attack of a wide range of corrosive spillage, including acids, alkalies, solvents, salts, greases and detergents.



HOODS, DUCTS, FUME SYSTEMS



completely resistant self-supporting rigid plastic structures are designed and fabricated to meet your specific requirements . . . complete plastic pipe systems including flanges, valves and fittings are also available.

PLANT INTERIORS

protection of all corrodible surfaces is possible by using the proper Atlas coating . . . vessel exteriors, walls, beams, ceilings can be coated for lasting service.

ATLAS MINERAL PRODUCTS COMPANY
MERTZTOWN, PENNSYLVANIA

Atlas provides a complete corrosion service from on-the-spot technical advice through engineering design to complete construction facilities to carry the job from beginning to end.

ATLAS PRODUCES THE MOST COMPLETE LINE OF CORROSION PROOF MATERIALS OF CONSTRUCTION AVAILABLE FROM ONE MANUFACTURER

For more facts circle 620 on Reply Card

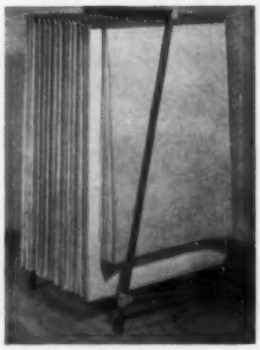
NEW PRODUCTS

(Begins on page 172)

self, which provides greater polishing area and greater accessibility, and a spare 1½ in. blade which fits into original case. Burnisher elements give a microfine polish without pitting or scratching, it is noted. Under this method a series of knife-like edges are produced to polish contacts smoothly. Residual oil film, carbonaceous deposits, grit, dirt and contact filling are claimed to be eliminated. The pen-type case, made of an insulating plastic, is designed to permit use on energized contacts, without danger of shock. The handle is also of an insulating material. The Adre Co.

53—VERTICAL FILE RACK for large sheets, blueprints

The Stikfile System is announced as an efficient method of binding and vertical filing of large sheets, such as blueprints, maps, drawings. It features a diagonal



leg rack, which provides a steady, self-supporting holder for binders. The system utilizes a metal channel with a hardwood dowel forming a removable core. This core adjusts up or down by means of metal screws threaded through top of channel wedging sheets firmly, yet allowing removal or addition of one or more. Provision is made for hanging these binders in a variety of racks provided by company, or they may be incorporated into most existing systems. Binders come in 12 stock lengths and racks in several models. The Dancer Co.

54—CENTRIFUGAL PUMP saves both space and cost

For pump users who want to conserve on both space and investment, this company offers standard, close coupled, centrifugal pumps designed for many applications where conditions do not necessarily require a more costly "engineered" pump. Identified as Type GSC, the line comprises seven pumps with capacity to 600 gpm, total dynamic head to 275 ft. Temperature range of pumpable liquids is -40 to 250 F. The line is available in bronze fitted, all iron, and all bronze. Standard construction includes removable back head to permit removal of impeller without disturbing piping; large cradle opening

For more facts circle 621 on Reply Card ——→

FREE TO YOU

This helpful, informative Macwhyte *Safe-Lock* Wire Rope Assemblies Catalog 5601

Macwhyte Wire Rope Assemblies have a wide variety of applications. They may be used for operating controls, as a part of machinery and equipment, or for slings and hoists.

They are widely used on small gasoline powered equipment, outboard motors, mining machines, agricultural implements, automotive equipment, aircraft, boats and yachts, production machinery, laboratory equipment, etc.

This catalog will prove invaluable to you in determining assemblies for your needs. For your free copy write on your company letterhead to: Macwhyte Company, Kenosha, Wisconsin. You'll receive your free Catalog postpaid, by return mail.

MACWHYTE
COMPANY

2906 Fourteenth Ave., Kenosha, Wis.

1105AS

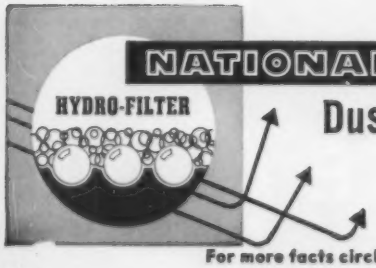
WHO SAID you can't combine efficiency and ease of maintenance in a dust collector?
EFFICIENT. Turbulent area of water, bubbles and mist assures constant, sustained air water contact.
EASY MAINTENANCE. Dust never comes in contact with dry surface. Sludge is settled, removed automatically. Glass spheres are self-cleaning.

Hydro-Filter offers real simplicity to wet collection problems

Simplicity is the *success* of the National Hydro-Filter and is why it offers constant dust collection efficiency to the micron range *combined* with low operating costs and maintenance that amounts to but *minutes a month!*

Look at the photo—Every inch is *active* space. There is nothing to clog, no baffles to "load up" and reduce efficiency. Water, air and glass spheres do the work and a constant flow of water carries contaminants to the sludge tank where they are automatically ejected.

Sound simple? . . . It is, and the whole story on Hydro-Filter is contained in a comprehensive bulletin that is available on request. Write for your copy today.



Dust Collector Corp.
604 Machinery Hall Bldg.,
Chicago 6, Illinois
Subsidiary of National Engineering Company,
Manufacturer of Simpson Mix-Mullers.

For more facts circle 622 on Reply Card

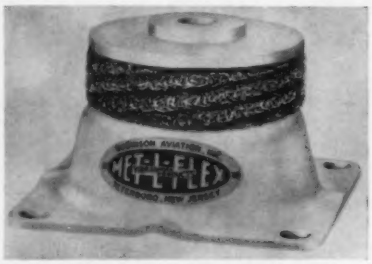
NEW PRODUCTS

(Begins on page 172)

for free access to stuffing box; and a stuffing box adaptable, interchangeably, to packing and mechanical seal. Dean Brothers Pumps, Inc.

55—METAL MOUNTING for shock, vibration control

Machine tools, generators, punch presses and air conditioning and refrigeration equipment are among applications for the Series W164 Mounting, an all-metal general purpose unit constructed of aluminum and load carrying Met-L-Flex resilient elements and reported capable of attenuating 20 G impact shocks. Knitted stainless steel wire cushions formed and compressed to exact dimensions are the essential vibration and shock isolation elements. It is explained that the nonlinear spring rate of these elements produces increasing stiffness as loads increase to prevent abrupt "bottoming" of the mounting, and severe rebounds due to shock are eliminated.

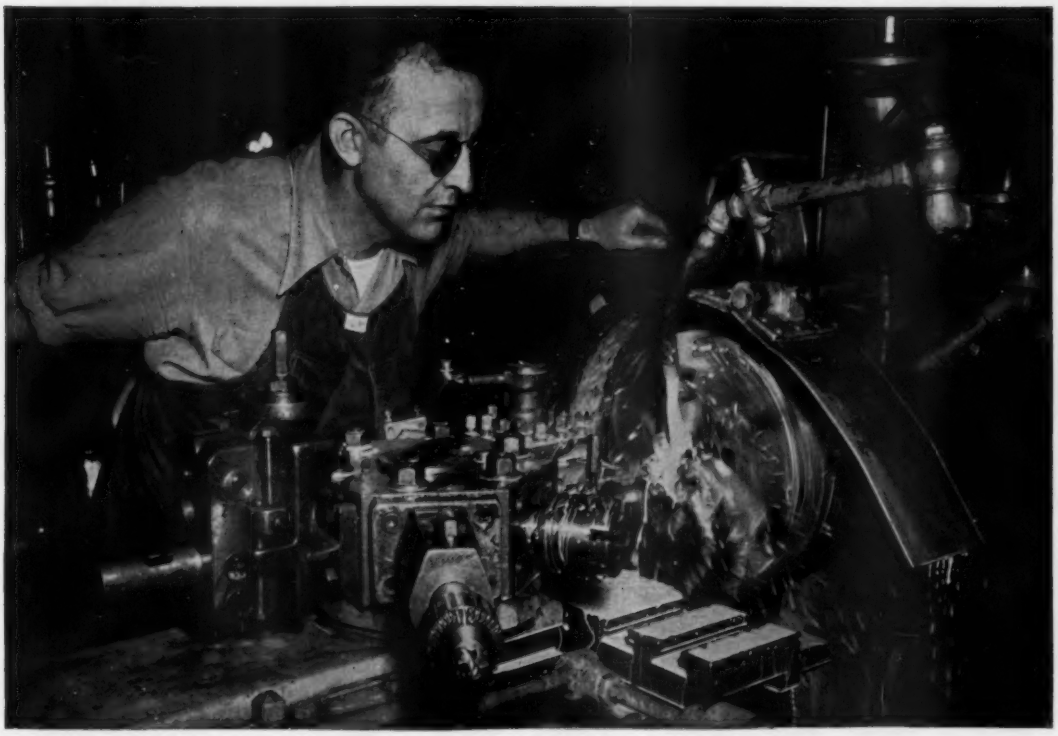


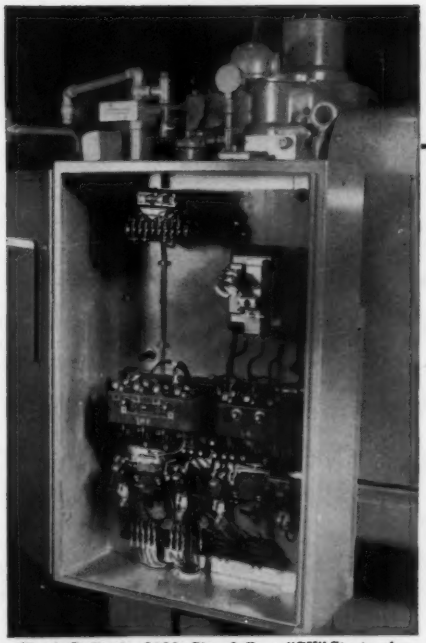
Performance characteristics are claimed unaffected under a wide range of temperatures, regardless of age, exposure to oil, water, solvents and mild acids. Natural frequencies of the mountings are between 13 and 17 cycles per second, it is stated, and it will provide vibration isolation at disturbing frequencies above 1250 cycles per minute. The Series W164 may be used as either a compression hanger type mount or inverted hanger type. Four ¼-in. bolts are used for either floor or structural mounting. Robinson Aviation Inc.

56—MOTORS offer increased radial load capacity

New Slo-Speed Gear Motors and Speed-Trol Variable Speed Motors with reducer are announced for severe radial load duty. This is accomplished through extended bearing construction on the speed reducer. Distance between bearings on output shaft has been lengthened to increase both radial load capacity and rigidity. Ratings now available and others to come will complete the line through 15 hp. Standard AGMA speeds are furnished from 350 rpm through 20 rpm in both constant and variable speed models.

Many applications are anticipated because this development minimizes need for secondary support bearings, states manufacturer. On agitator drives, a





Clark Bulletin 6050, Size 2 Type "CY" Starter for Single Winding 2 Speed Constant Torque A.C. Motor used on Warner & Swasey Universal Turret Lathes.

CLARK CONTROLS help Warner & Swasey lathes

"machine better, faster, for less"

● Selected for long, trouble-free performance, Clark Bulletin 6050 Size 2, Type "CY" 2-speed starters are used on Warner & Swasey's No. 5 Universal Turret Lathes. Maintenance and wear on contact tips are reduced to a minimum as a result of an exclusive arc quenching method employed on Type "CY" starters. Effective arc interruption and reduced wear on tips is accomplished by using strong multi-turn magnetic blowouts and double-break contacts. Forced rotation continuously moves the arc from a hot to a cold spot, distributing the heat evenly over entire contact, preventing pitting or "build-up." Tips require no cleaning or dressing over long years of maintenance-free operation.

Write for complete descriptive literature.

The **CLARK** **CONTROLLER** *Company*

Everything Under Control

1146 East 152nd Street • • Cleveland 10, Ohio

IN CANADA...CANADIAN CONTROLLERS, LIMITED • MAIN OFFICES AND PLANT, TORONTO

For more facts circle 623 on Reply Card

NEW!

Blaw-Knox Grating and Tread Catalog

This brand-new, comprehensive catalog presents more useful application information than ever before. Complete descriptive information such as spacings, weights, panel widths and bearing bar surfaces are included for each type of grating.

In addition, a wealth of useful data such as tables of safe loads, fastening methods, and model specifications are included.

If grating application and installation is part of your responsibility, you should have a copy of this useful publication. Send for your copy today. No obligation, of course.

BLAW-KNOX COMPANY
Blaw-Knox Equipment Division
1102 Blaw-Knox Building, 300 Sixth Avenue, Pittsburgh 22, Penna.

GRATING APPLICATIONS: floors • platforms • walkways • catwalks • stair treads • fan guards • shelving • and many other uses, both outdoors and indoors, for versatile steel grating

Blaw-Knox Equipment Division
1102 Blaw-Knox Building • 300 Sixth Avenue
Pittsburgh 22, Pennsylvania

Gentlemen: Please send me a copy of New Blaw-Knox Grating Catalog 2527.

Name_____ Title_____
Company_____
Address_____
City_____ Zone____ State_____

For more facts circle 624 on Reply Card

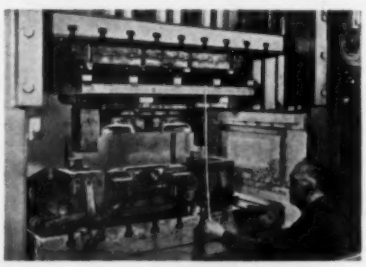
NEW PRODUCTS

(Begins on page 172)

rigid coupling can directly connect the reducer shaft to the paddle shaft and pilot bearing be omitted, it is pointed out. Chain drive sprockets can be mounted a greater distance out from the mounting feet than formerly, and this increases machine clearance where economical integral mounting was hampered by space restrictions. Both the gear motors and the variable speed motors offer advantage of horizontal, vertical or sidewall mounting without modification. Sterling Electric Motors, Inc.

57—LIGHTING UNITS for use on punch presses

Presslite Machine Lighting Units, designed to provide glare-free illumination of the entire die bed area of punch presses now in service are announced. Already standard equipment on many new presses, these lights are said to eliminate eyestrain, reduce operator fatigue and promote greater safety—as well as increased



production and reduced possibility of damaging dies. Presslites have a Plexi-lux louvered shield. Louvers are shatterproof oil-resistant Plexiglas, machine-etched 16 cuts per inch at a 45-deg angle. This serves to eliminate glare from the enclosed lamps, but permit high light transmission with low surface brightness. Louvers are etched lengthwise or across their width to permit either vertical or horizontal mounting of units. Five models are available for operation on 110-v 60-cycle a-c, furnished wired, with electrical components in a steel housing. Each Presslite has four single-pin cold cathode lamps which operate from two instant-start type ballasts. Lamps range from 8 to 40 w. Sun-Lite Mfg. Co.

58—PRESSURE UNIT cleans walls, floors, equipment

The Saniseptor, Model 562, is designed to convert a plant's hot water system into a spray cleaning instrument. The unit is simply filled with powdered detergent, hooked up to the hot water faucet and turned on. The stream of water passing under pressure through the Saniseptor siphons up the detergent and becomes a powerful cleaning solution, it is explained, and when sprayed through the nozzle, this solution can reach into places inaccessible to hand cleaning. The unit weighs but 36 lb empty and holds about

For more facts circle 625 on Reply Card →

For general illumination, The Scott fixture by Sylvania provides soft, even light, has extremely high, 89.8%, illumination efficiency—giving a bonus in performance at no additional cost.

For close-work areas, mounting The Scott parallel to workers' line of vision brings maximum lengthwise shielding benefit into play. Lightweight plastic louver combines outstanding appearance with installation and maintenance features.

Supplementary lighting no longer needed...

Sylvania's Scott Fixture now provides precision lighting at Bendix Aviation

ENGINEERS WORKED OUT an unusual and successful lighting approach at the Eclipse Pioneer Division of Bendix Aviation Corp., Teterboro, New Jersey. In a semi-industrial area, they used a commercial-type fixture... Sylvania's *Scott* . . . to provide general illumination for precision motor assembly work.

Here The Scott does a double lighting job by eliminating the supplementary lighting system used previously:

1. **The Scott,** with its all-plastic reflector-shield, gives Bendix 110-116 footcandles of light at working level. It holds shadows and glares to a minimum, makes difficult seeing tasks easier.
2. **The Scott's** clean, attractive appearance harmonizes with the modern interior. Bendix personnel proudly show the installation to visitors as one more way Bendix protects the quality of its products.

Sylvania's *Scott* fixture offers many economies in both industrial and commercial applications. Because it has an exceptionally high, 89.8%, efficiency, *The Scott* will, in many cases, give the desired illumination levels with fewer fixtures—along with quality lighting.

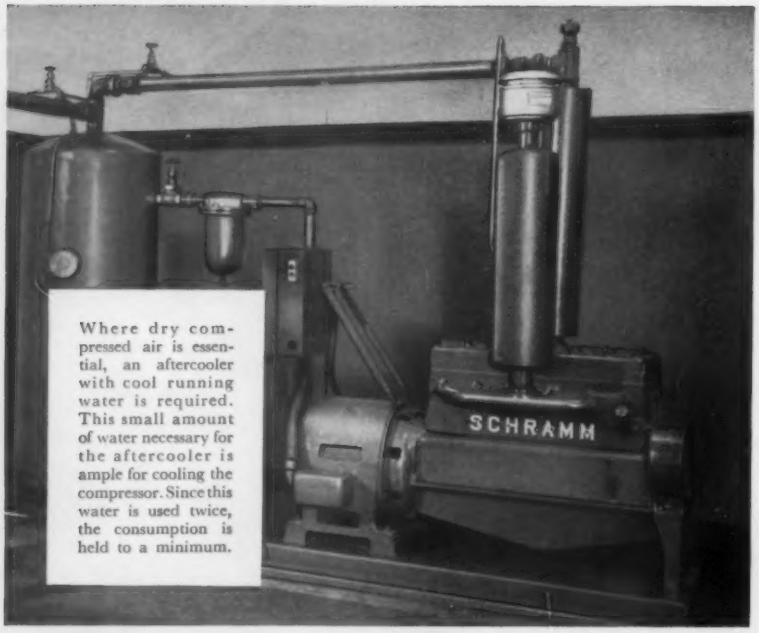
Next time you have an illumination problem either in industrial or commercial "close-work" areas, investigate the many advantages of lighting with Sylvania's *Scott*. For complete information, contact your local Sylvania Lighting Specialist, or write directly to:

SYLVANIA ELECTRIC PRODUCTS INC.
Department C-3,
Lighting Division—Fixtures
One 48th Street,
Wheeling, W. Va.

SYLVANIA

... fastest growing name in sight

LIGHTING • RADIO • TELEVISION • ELECTRONICS • ATOMIC ENERGY



Where dry compressed air is essential, an aftercooler with cool running water is required. This small amount of water necessary for the aftercooler is ample for cooling the compressor. Since this water is used twice, the consumption is held to a minimum.

COMPRESSOR EXPERT EXPLAINS WHY:

Your compressed air need not be wet

Water in compressed air systems is a costly nuisance. It can ruin spray-painting jobs, make sand-blasting ineffective, or rust air tools beyond repair. How does it get in—and how can it be kept out?

Water gets into compressed air systems because *all* atmospheric air contains moisture. When you compress air, you raise its temperature—and its moisture-carrying capacity. When it cools in air receivers and lines, it loses its ability to carry moisture and as much as 80% of the moisture becomes water. This can amount to as much as 2 gallons per hour. But NOT where a Schramm *dry compressed air system* is used.

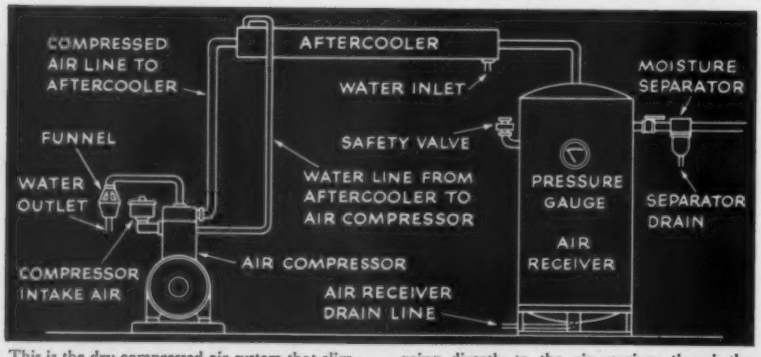
With a Schramm Industrial Air Compressor and Aftercooler, water can be almost completely eliminated. You get *dry compressed air* because the Schramm system places an aftercooler in the line between the compressor and the air receiver. The aftercooler reduces air temperature to a point where most of the moisture is condensed into water and no further precipitation occurs. Most of the water falls out in the receiver and is expelled by an automatic trap, while the remaining water is removed in the separator. The small amount of moisture remaining in the air will be invisible vapor and will cause no trouble.

Our new folder, "Compressed Air Isn't All Wet," is packed with information you'll want if you have a moisture problem. Write for your copy today, there's no obligation.

Schramm, Inc.

MANUFACTURERS OF AIR COMPRESSORS

665 North Garfield Ave. • West Chester, Pa.



This is the dry compressed air system that eliminates objectionable water. Note placement of Schramm Aftercooler between Schramm Compressor and air receiver. With compressed air going directly to the air receiver *through* the aftercooler, most of the moisture falls out in the receiver and leaves less for the separator to remove. Result: drier compressed air.

For more facts circle 626 on Reply Card

NEW PRODUCTS

(Begins on page 172)

15 lb of powdered detergent—enough for several hours of cleaning under normal conditions. It consists of a seamless steel detergent tank equipped with a water hose connection to the hot water supply, a siphon breaker, and solution and water control valves. Oakite Products, Inc.

59—SELF-CONTAINED SEAL for pumps, reduction units

The BA12A-10 is introduced as a self-contained, compact seal for all types of jet water pumps, oil pumps, reduction units, other equipment. Manufacturer says it can be used on any rotating shaft to seal any liquids that will not attack the Buna-N flexible parts or the brass metal parts. The face of the seal, designed to stand high face loading and heat, is made from filled true carbon to prevent porosity. A roll designed bellows is incorporated to allow greater travel. This seal is recommend by manufacturer to operate against pressures to 100 psi, is available for ⅝- and ¾-in. diam shafts with general operating limitation of 212 F with shaft speeds as high as 1000 fpm. The Garlock Packing Co.

60—COATING protects wide range of equipment

Pitt Chem Tarset is claimed to be the most versatile of coal tar coatings, being applicable for raw materials handling equipment, storage tanks, blast furnace and coke oven equipment, and other conditions where protection has been seemingly unobtainable. A coal tar-epoxy resin combination, Pitt-Chem Tarset provides maximum protection against oil brines, hydrogen sulfide, petroleum crudes, and diesel fuels, states manufacturer; it will not shatter or loosen at temperatures down to -30 F or soften at 400 F. Pittsburgh Coke & Chemical Co.

To receive product data circle item numbers on the handy Reader Service Cards provided on pages 257-258.

61—PLASTIC repairs floors cracks, other defects

Formulated for quick repair of expansion joints and floor cracks, Jiffy Floor is a fine granular, ready-to-use plastic product. Company says it readily fills hairline cracks and shallow holes or spalled floors, and that you can apply it without disrupting production and it will stand heavy loads immediately. It will not crack, crumble or curl, it is announced, and can be used indoors or out—temperature changes don't affect it. When applied, Jiffy Floor is said to be waterproof, dustless, skid-proof and

Fire Protection for UARCO Inc.

includes 1,138 sprinkler heads, five fire hydrants . . . and a HORTON ELEVATED TANK

If fire breaks out anywhere in the 63,885 square feet of the modern UARCO plant at Watseka, Illinois, there is always 100,000 gallons of water ready to flow from a Horton® elevated tank to the nearest hydrant or sprinkler head. The Horton ellipsoidal-bottom elevated tank holds this water day and night, ready to flow by dependable gravity pressure the moment it is needed.

A Horton elevated tank connected to an automatic sprinkler system provides maximum plant protection. Water is available day and night to quench fires *before* they cause widespread damage. *No plant can afford a fire!*

Write our nearest office for further information, estimates or quotations on Horton elevated tanks.

CBI

Chicago Bridge & Iron Company

Atlanta • Birmingham • Boston • Chicago • Cleveland • Detroit • Houston
New York • Philadelphia • Pittsburgh • Salt Lake City • San Francisco
Seattle • South Pasadena • Tulsa
Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PA.

CORROSION

TYPE	HOW TO IDENTIFY
GALVANIC	Localized deep grooves or pits, often at contact between dissimilar metals.
UNIFORM	Uniform attack—may be on only one part.
INTERGRANULAR	Attack at grain boundaries.
PITTING	Rapid, deep pitting at several small areas. May be uniform or highly localized.

Why you can conquer all four kinds of corrosion with Goulds chemical pumps

When you buy Goulds Fig. 3715 chemical pumps you can build *specific* protection against all four types of corrosion.

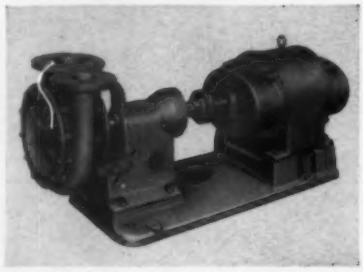
Match the pump metal to your liquids. You can have the *entire* fluid end of the pump made of 316 stainless, Gould-A-Loy 20, nickel aluminum bronze, iron, iron with stainless trim or nickel aluminum bronze trim. These metals from stock. Any machinable alloy on application.

All machined parts in all metals held to same close clearances permitting economical alloy changes in the field . . . the entire liquid end or any component as conditions warrant.

Choosing from this wide range of metals, you can combat the different corrosive actions of hot acids, alkalies, slurries, sizes, or whatever other corrosive liquids you pump.

Match pump size to job

You can get Goulds Fig. 3715 in 9 sizes: capacities to 720 GPM, heads to 200 ft. Other features of Fig. 3715: water-jacketed support head permits handling liquids at 350°F.; impeller clearance can be adjusted without dismantling the pump. For more information, write for Bulletin 720.4.



These larger pumps also fight corrosion

For larger capacities or heads, you can get these other Goulds pumps in metals that resist specific corrosion:

Fig. 3405—single stage, double suction; 19 sizes; capacity to 6400 GPM, head to 425 ft. Bulletin 721.6. Popular sizes available in 316 stainless steel from stock.

Fig. 3305—two stage, opposed impellers; 8 sizes; capacity to 1200 GPM, head to 1000 ft. Bulletin 722.6.

Fig. 3189—single stage, open impeller; 11 sizes; capacity to 1080 GPM, head to 180 ft. Bulletin 720.4.

Goulds PUMPS INC. Seneca Falls New York

Branches: Atlanta • Boston Chicago • Houston New York • Philadelphia Pittsburgh • Tulsa

West Coast Representative: Goulds Pumps Western, Portland, Ore.

In Canada: The A. R. Williams Machinery Co., Ltd. in all principal cities.

For more facts circle 628 on Reply Card

NEW PRODUCTS

(Begins on page 172)

noiseless. There's no mixing; application consists merely of priming, filling and tamping. Form 168-11 gives details on Jiffy Floor. The Monroe Co., Inc.

62—PARTITION, side coiling, for large areas

Designed to provide durable, compact, and architecturally attractive separation of large areas, such as cafeterias, these wood side-coiling partitions are constructed for openings up to 22 ft high, 130 ft wide.

They incorporate a new positive slat alignment, suspension and coiling control features. Upper and lower end lock assemblies are threaded on and riveted to continuous spring steel ribbons to prevent separation of slats and maintain alignment in coiling. The partitions have ball-bearing mounted nylon rollers, for quiet travel in upper track. Meeting stiles of Alumilited aluminum have compressible Neoprene rubber nosings.

A simple, transmission system with just two moving parts is used on power or crank operated partitions. Upper track may be mounted within or below ceiling or lintel or to one side of lintel. Coil boxes may be installed inside or outside of wall spaces. Slats are available in a variety of woods. Bulletin 603 gives details. The Cookson Co.

63—ELECTRONIC SYSTEM automates precipitators

For electrostatic or electrically powered precipitation equipment, this automation system is designed to eliminate manual and visual electrical controls, replacing them by continuously acting feedback servo-circuits. The precipitator is placed in operation by a single start-stop switch for all rectifiers. These electronic circuits, one for each individual electrical set, act to continuously maintain rectifier power output at level for best precipitator performance. Precipitators should be operated at highest possible voltages and power inputs, which in general are limited by sparkover between precipitator electrodes, it is explained—often 50 to 100 sparks per minute. Operation under these conditions requires circuits designed for rapid recovery of precipitator voltage following sparkover.

This control system functions by continuously monitoring and readjusting spark rate to maintain optimum voltage and power input. These vary with changing precipitator conditions—such as the temperature, flow rate, humidity of gas

TRACKMOBILE *Gets Around*

FREIGHT HANDLING PROBLEMS

Trackmobile is the economical way to switch, spot and haul freight cars—at your convenience! It transfers from rail to road wheels—travels on ground to places where needed—quickly gets back on the track, ready to push or pull. Recently published 8-page report (shown at left) tells how this unique feature eliminates "bottlenecks," speeds freight movement and saves money. Send for it—you'll read how Trackmobile gets traction to pull heavily loaded cars and how its flexibility of operation provides many uses—even the hauling of skids or carts on its road wheels when not handling freight cars. *If there are as few as three car movements per day in your plant yard you will find Trackmobile a profitable investment* and well worth your consideration. Write for this important report now . . . ask for Bulletin T-122.

WHITING CORPORATION
15675 Lathrop Ave., Harvey, Ill.

Transfers from road to track in less than 2 minutes!

Powerful! Pulls heavily loaded cars day in—day out!

For more facts circle 629 on Reply Card

Ever try driving a nail into concrete? Now you can do it easily, with SHURE-SET, the new tool that guides fasteners into mortar, concrete—even steel!

Simple, easy and inexpensive—the SHURE-SET tool uses no outside power—just makes your hammer power more effective. This tool holds and directs fasteners with pin-point accuracy—ends pre-drilling, star drilling, filling, plugging and chipping. Saves time, money and effort.

There's no bend, bounce or buckle with SHURE-SET. Pins and studs go in where you want them. Ends the frustration, uncertainty and waste of other methods.

SHURE-SET by the makers of Ramset® —gives you a real advantage over old-style methods. Get the jump on your competition. Ask your supplier, or write now for full details.

COMPLETE KIT contains everything you need.

Shure-Set Trademark
HAMMER-IN FASTENING TOOLS
PATENTS PENDING
BY THE MAKERS OF Ramset® PRODUCTS

Ramset Fastening System
WINCHESTER-WESTERN DIVISION
OLIN MATHIESON CHEMICAL CORPORATION

12133-C BEREA ROAD • CLEVELAND 11, OHIO
For more facts circle 630 on Reply Card

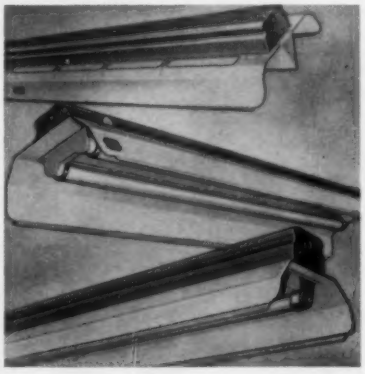
NEW PRODUCTS

(Begins on page 172)

being treated, size of particles being removed. Heart of the system, the control assembly serves to instantaneously adjust and maintain high voltage output of each rectifier at a preset point of optimum performance, regardless of changing process or precipitator conditions. This is done by a continuously operating feedback loop that compares actual current, voltage and sparking conditions in the precipitator with ideal, preset reference levels. Only moving parts in the system are relays that function on startup and shutdown. The units are compact and self-contained. They can be installed either directly on or near the precipitator. Research-Cottrell, Inc.

64—FLUORESCENT SYSTEMS for industrial lighting

Three fluorescent lighting systems are announced as embodying design and construction features which contribute to sustained efficiency, while reducing maintenance and operating costs. Channel sections are heavy gage steel, reflectors are

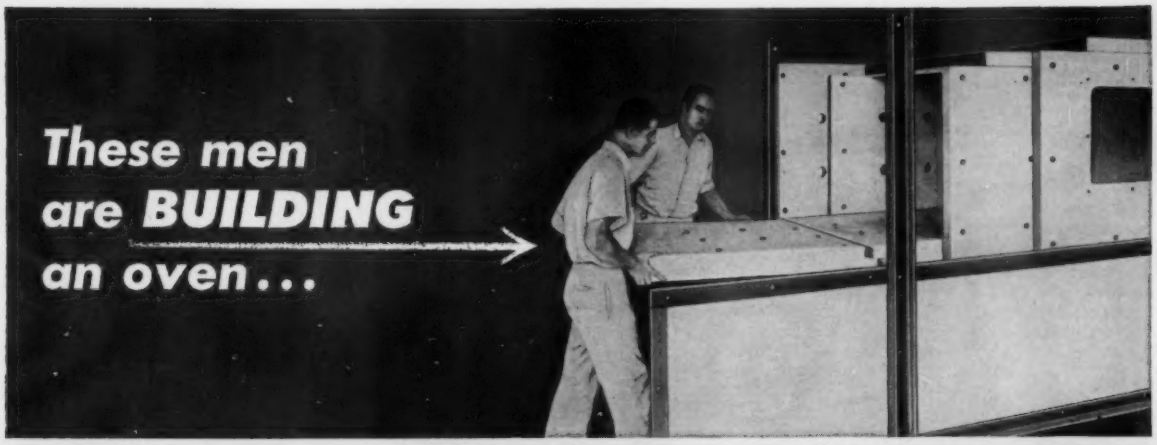


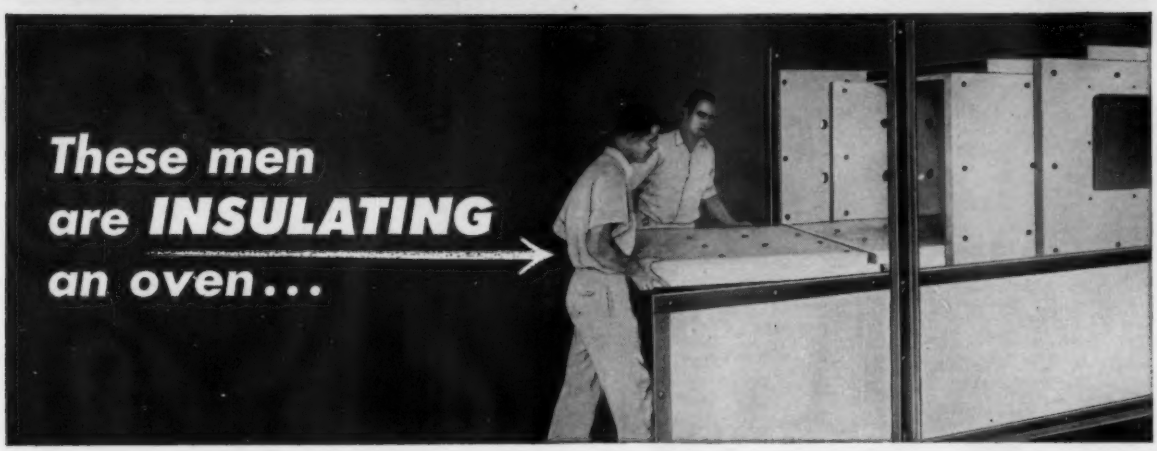
heavy gage enameling iron finished in porcelain enamel. Reflecting surfaces have a reflection factor of 85 per cent or more, and Lok-Latch fasteners facilitate reflector removal.

First of the new systems is RLM Twin-Flo SD-1 semi-direct equipment with 25 per cent upward light for greater seeing comfort. This system is available for three types of T-12 lamps, including the new high-output 800 ma rapid-start lamps. A second system incorporates RLM equipment for 60-in. 90-100 w, T-17 preheat lamps. The third is for 48- and 96-in., 800 ma high output rapid-start lamps. Benjamin Electric Mfg. Co.

65—ION EXCHANGER is packaged, mixed-bed unit

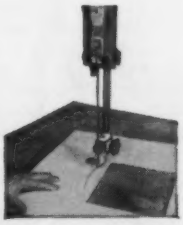
Illco-Way Packaged IonXchangers are fully-automatic units, shipped assembled, with gravels and resins in place, ready for connecting and operating. Manufacturer points out that the mixed-bed principle of ion exchange provides water that is free of silica and ionizable solids





...with J-M MARINITE*—
the structurally strong insulation that controls heat to 900F

LARGE SHEETS speed construction, are light and easy to handle, provide maximum heat control.



EASY TO WORK, Marinite may be cut, drilled, and shaped with ordinary woodworking tools.

Provides economical operation. J-M Marinite permits uniform temperature control in ovens, driers and other high-temperature equipment. Low heat capacity . . . reduces heat-up and cool-off time. Homogeneous material won't bulge, settle or sag . . . eliminates "Hot spots." Outside framing cuts through-metal heat loss to a minimum.

Needs no maintenance. J-M Marinite is made from asbestos and diatomaceous silica. Unaffected by moisture . . . won't rust, rot, mold or corrode. Normally requires no protective coating. Easy to keep clean. Lasts indefinitely without replacement. Minimizes down-time.

Easy to erect. J-M Marinite builds and insulates in one operation. Easily fabricated with woodworking tools. Can be applied by your own construction crews . . . no special training needed. Goes up fast with minimum angle-iron framing.

Write for new Marinite brochure IN-153A to Johns-Manville, Box 14, New York 16, N. Y. In Canada, Port Credit, Ontario.

*Marinite is a registered Johns-Manville trade mark.

Johns-Manville *first in* **INSULATION**

MATERIALS · ENGINEERING · APPLICATION

For more facts circle 631 on Reply Card

NEW PRODUCTS

(Begins on page 172)

with high purity readings. These ion exchangers are available in sizes suitable for most low make-up power plants. The unit consists of a regular mixed-bed column or tank, with associated external and internal piping mounted on a heavy welded steel base. Automatic operation is provided by motor valves, controlled by a conductivity meter and program timer to govern regeneration. Vessels and piping for refrigerants included. Illinois Water Treatment Co.

66—CONVEYOR for medium duty bulk handling

The Coilmount is engineered for applications in the intermediate ranges and capacities to augment and complement the light and heavy ranges of company's Flexmount line of oscillating conveyors for lighter duty bulk conveying and Torqmount Conveyors for heavy duty materials handling. Coilmounts are similar to both of these, except that the trough in which material is conveyed is supported by cast aluminum rocker legs and coil springs. Motion is imparted to material carried by means of a constant-stroke eccentric drive that produces an upward and forward oscillating movement resulting in a gentle, continuous forwarding of materials regardless of overloads or surges. It is available from stock in assembled sections of 5- to 10-ft lengths, in trough widths of 10 and 20 in., in 10-gage or 3/16-in. trough thicknesses. Sections can be assembled in lengths to 100 ft. Book 2644 gives full details on the Coilmount. Link-Belt Co.

67—WELDING ELECTRODE operates in all positions

Airco 90B is announced as a general purpose electrode meeting AWS and ASTM E-6013 classification. It is a heavily coated type of moderate arc force designed to operate in all positions on a-c or d-c, reported particularly useful for welding mild steel to medium carbon and low alloy steels. In addition to high mechanical and impact properties, the finished bead is claimed free of surface depressions common to this type of electrode. The electrode is suggested for general purpose use, as small diameters are readily acceptable for light gage work while the larger diameters produce good welds on the heavy sectioned weldments. Air Reduction Sales Co., Div. Air Reduction Co., Inc.

It's easy to obtain product data with the postage-free Reader Service Cards provided on pages 257-258. Use them for information on advertised products, too. Just circle the key number appearing at bottom of the ad.

68—STORED ENERGY UNIT works circuit breakers

Designed to operate magne-blast circuit breakers with metal-clad switchgear, this stored energy mechanism receives its energy from a small operating motor. It is described as suited for general application on industrial and other power systems, and is available in voltage ratings from 4.16 to 13.8 kv, interrupting ratings from 150 to 750 mva. It is suggested for installations where it is desirable to provide only a limited source of a-c or d-c closing power.

According to company, this mechanism makes it possible to dispense with a relatively large operating battery or control power transformer, and closing rectifiers otherwise required. Tests are reported to show that when operating a magne-blast breaker, this device will surpass the mechanical life requirement of 10,000

COST...SPACE...TIME...LABOR
SAVER
the Ransohoff AUTOMATIC Parts and Tote Pan Cleaning Machine

Parts in tote pans placed in machine are automatically loaded into the drum type washer section. The empty tote pans automatically enter the integral conveyor type washer section above in an inverted position. At the discharge end, clean, dry parts are loaded in the same, clean, dry tote pan!

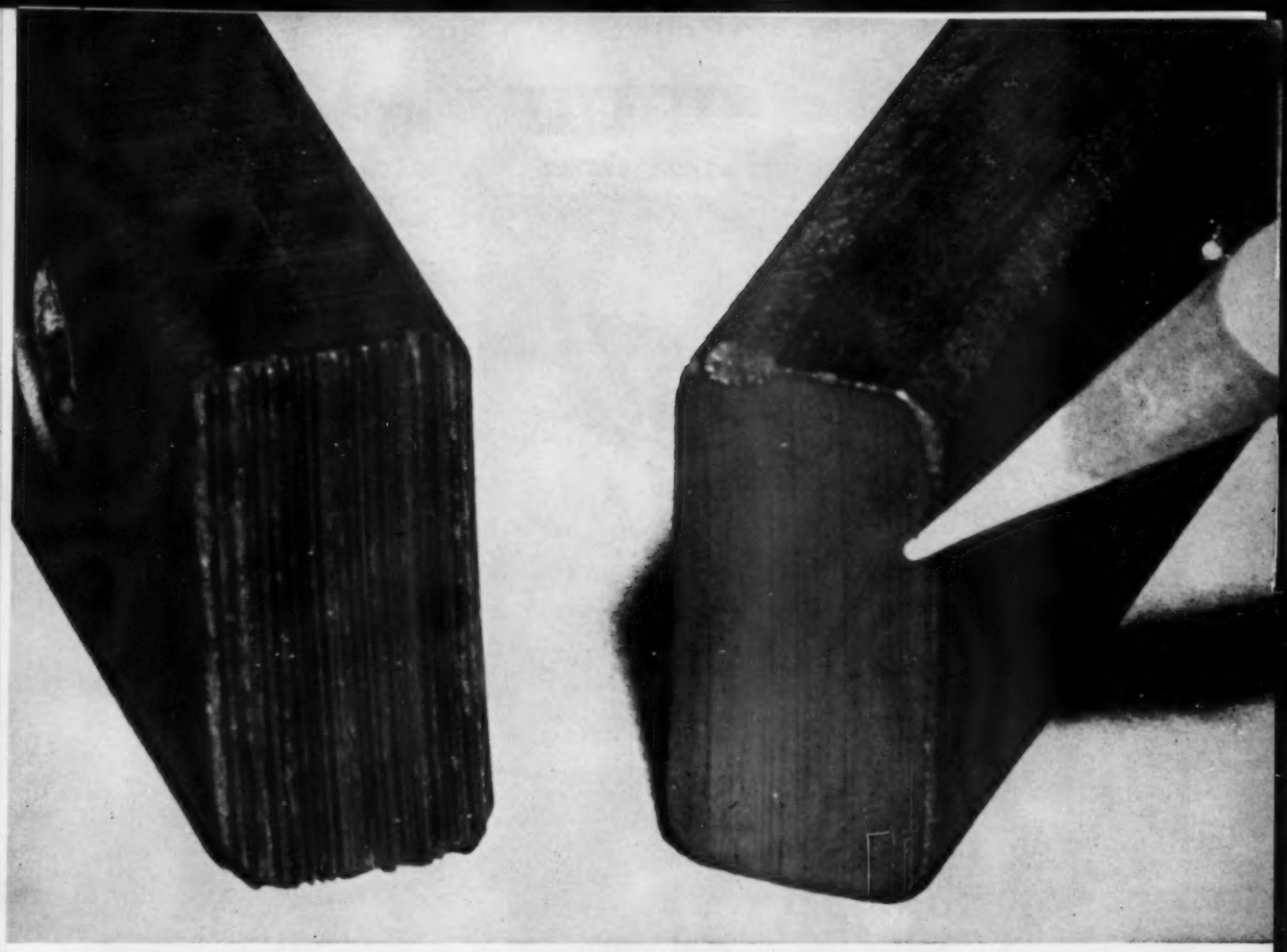
This machine was designed and built to wash, rinse and hot air dry a wide range of parts for a well known fastener manufacturer. It can also be designed for any combination of washing, pickling, neutralizing, phosphate coating, etc., parts, cleaning tote pans at the same time.

Savings in cost, space, time and labor are substantial since one machine does the work of two! Floor space requirements are cut in half, production rate is increased as desired and automatic features free operating labor.

Ransohoff engineers will gladly survey your cleaning requirements, suggest production-proved methods to cut costs and improve results in your plant. **For complete details, write: Ransohoff, Inc., 650 N. Fifth Street, Hamilton, Ohio.**

The oldest name... the newest ideas Ransohoff

For more facts circle 632 on Reply Card



Wrong brush: This magnified view shows threading on brush after approximately 1000 hours of operation in nitrogen on a totally enclosed synchronous motor.

Right brush: After 1000 hours on the same motor this specially developed General Electric carbon brush has suffered comparatively little wear.

Even a nitrogen bath didn't faze the right General Electric carbon brush

The threaded carbon brush at left above had just spent 1000 hours operating on a totally enclosed synchronous motor filled with pure nitrogen. Such a brush surface indicates excess wear on the collector ring and results in increased maintenance and lost production time.

The solution? A General Electric carbon brush, developed for operation in nitrogen atmospheres. The brush at the right above shows little wear after 1000 hours of operation, giving assurance of continued satisfactory service.

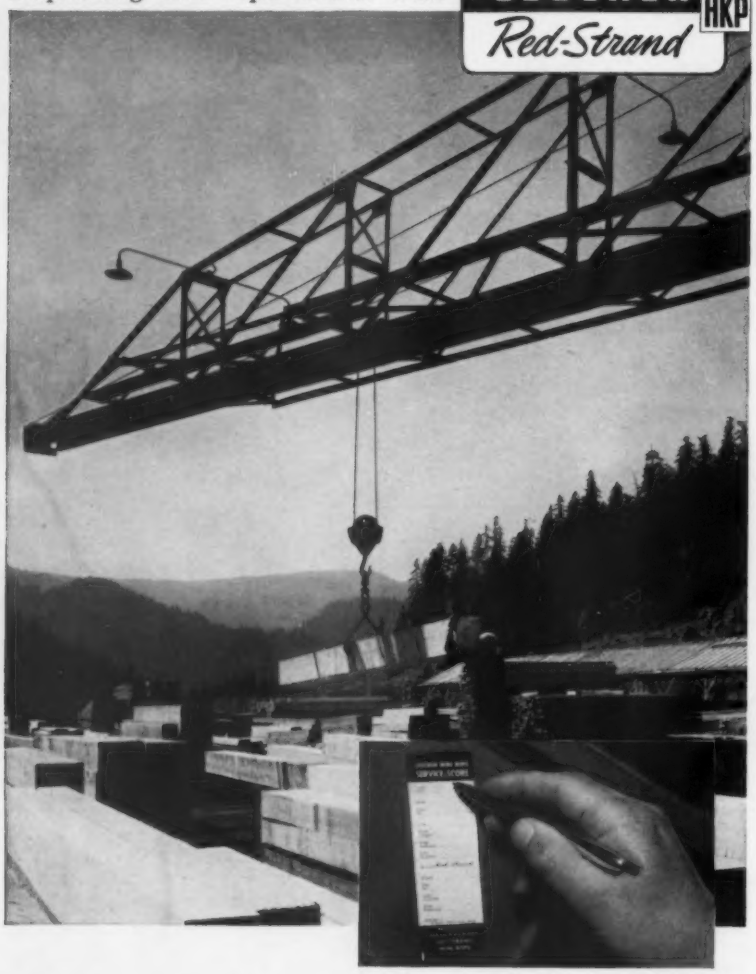
Of course, not all brush problems are this easy to solve. But one way you can help avoid trouble is to specify General Electric carbon brushes which have been specifically designed and tested for your G-E motors and generators. A complete line for any G-E motor or generator over one horsepower is available. For more information contact your nearest General Electric Apparatus Sales Office or General Electric Distributor. Write for Bulletin GEA-5597. General Electric Company, Section 774-3, Schenectady 5, New York.

Progress Is Our Most Important Product

GENERAL ELECTRIC

For more facts circle 633 on Reply Card

Improving wire rope service with LESCHEN HKP *Red-Strand*



How much can you save with Leschen wire rope service?

Wire rope costs can be reduced substantially—10%, 20% or more—by using the right rope type, construction and brand for every job.

How can you tell if you are using the right rope? How much can you save? There's a simple way to find out. You can obtain accurate, on-the-job performance data by using Leschen's Service-Score Sticker System. You'll prove to yourself which ropes work best. And when you see the score, you'll use more Red-Strand wire rope—because Leschen quality and Leschen engineering service can save you money.

Service-Score Stickers are available from any Leschen field man or distributor. Just ask, or write Leschen Wire Rope Division, H. K. Porter Company, Inc., St. Louis 12, Mo.

HKP LESCHEN WIRE ROPE DIVISION
H. K. PORTER COMPANY, INC.

For more facts circle 634 on Reply Card

NEW PRODUCTS

(Begins on page 172)

operations specified by industry standards. Breakers equipped with it will operate in existing up-to-date metal-clad equipment interchangeably with a-c or d-c solenoid operated breakers, manufacturer states. General Electric Co.

69—FIXTURES feature unit construction

Versatility and easier installation and maintenance are advantages attributed to the special unit construction of the VM series VaporMaster line of lighting fixtures. They can be converted for use with larger or smaller lamps without using tools or disturbing wiring, it is pointed out. According to manufacturer, the unique aspect of the series is an

all-in-one aluminum unit which combines socket and globe holder and guard. The unit is available in two sizes, one for lamps up to 150 w and the other for 150-, 200-, or 300-w lamps. Changeover for lamps of less or greater wattage is achieved in one operation. The entire assembly of holder with socket, guard, globe and lamps is removed from the Condulet and the alternate size unit substituted.

Relamping is done by releasing a stainless steel retaining spring which clamps the globe to prevent vibration, removing globe and replacing the lamp—or by extracting the entire adapter-guard assembly from the Condulet body and replacing it with a unit containing a new lamp. A series of gaskets serve to make a vaportight seal between globe and holder, reflector and body, and holder and reflector. Crouse-Hinds Co.

70—SEALING DEVICE speeds, simplifies boiler cleanouts

You can make your own vacuum on a 55-gal drum to hold soot and dirt from the boiler or any wet or dry cleaning job, it is announced, by using the Drum-Seal and a suitable vacuum head to provide suction. The method is reported especially applicable for wet pick-up jobs where capacity of most vacuum cleaners would be inadequate for the amount of water to be picked up. Drum-Seal fits over any container or drum normally used

want on-the-spot service?

Then you'll like Crucible's *special steel* warehouse service. It's designed to insure dependable, nearby delivery of practically *any* special steel you need, when you need it. And in just about *any* quantity.

Next time you need special steels—call Crucible. You'll find we're *big enough to serve you — small enough to want to.*

Stocks maintained of:
Rex High Speed Steel . . . ALL grades of Tool Steel (including Die Casting Die and Plastic Mold Steel, Drill Rod, Tool Bits, and Hollow Tool Steel Bars) . . . Stainless Steel (Sheets, Bars, Wire, Billets, Electrodes) . . . Max-el, HY-Tuf, AISI Alloy . . . Onyx Spring, Hollow Drill Steel and other special purpose steels.

CRUCIBLE WAREHOUSE SERVICE

Crucible Steel Company of America

General Sales Offices, The Oliver Building, Mellon Square, Pittsburgh 22, Pa. Branch Offices and Warehouses: Atlanta • Baltimore • Boston • Buffalo • Charlotte Chicago • Cincinnati • Cleveland • Dallas • Dayton • Denver • Detroit • Harrison • Houston • Indianapolis • Los Angeles • Milwaukee • New Haven • New York Philadelphia • Pittsburgh • Portland, Ore. • Providence • Rockford • San Francisco • Seattle • Springfield, Mass. • St. Louis • St. Paul • Syracuse • Toronto, Ont.

For more facts circle 635 on Reply Card

Cut Clean, Punch True with These New, Extra Tough...

Snap-on CHISELS and PUNCHES

Snap-on set No. PC-170-K contains five starter punches and five drift punches 3/32 to 5/16 in.; five chisels 13/32 to 7/8 in.; and two sizes of center punches. Sizes are clearly marked on protective kit bag as illustrated.

This new *Snap-on* chisel and punch set contains the basic tools to handle a wide range of jobs. A mechanic can select the right chisel, starter punch or drift punch to get cleaner, more exact results, longer tool life.

Here is why experienced mechanics prefer *Snap-on:*

Special Steels scientifically heat-treated for long life. High silica, manganese, molybdenum steel is heat-treated under controlled atmosphere for uniform hardness. Chisel and punch heads are then induction-drawn to reduce hardness to just the right degree. The result is a controlled-mushrooming, long-life striking surface.

70-Degree chisel edge cuts better, stays sharp longer. Exhaustive tests by *Snap-on* engineers show that by shaping cutting edge to a 70-degree angle, the chisel cuts better, stays sharp longer.

New Octo-Square shape for firm, comfortable grip. *Snap-on* chisels and punches are square shaped with beveled corners to give user a better, more comfortable surface for firm control, greater safety, and prevent tool from rolling out of reach.

New-Style hold-tight kit bag. New kit bag folds easily — has a transparent flap which keeps tools from dropping out.

This chisel and punch set is one of many fine *Snap-on* tool sets. The *Snap-on* representative who calls on you can show you a complete range for production or maintenance work.

*Snap-on is the trademark of Snap-on Tools Corporation.

SNAP-ON TOOLS CORPORATION
8068-C 28th Avenue • Kenosha, Wisconsin

For more facts circle 636 on Reply Card

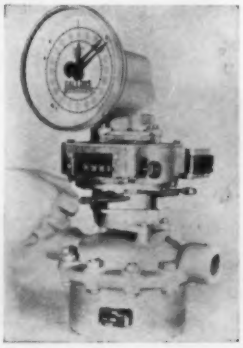
NEW PRODUCTS

(Begins on page 172)

to hold waste or trash in the boiler room, and is designed to hold manufacturer's vacuum drum head. Suction created by this head serves to draw the Drum-Seal tightly over drum top. Kent Co., Inc.

71—CONTROL SYSTEM adds safety to liquid metering

This explosion-proof control system moves petroleum and industrial liquid metering a step toward complete automation, according to company, and provides for automatic switch control of all pumps and quantity control valves right at the meter. Upon completion of a predetermined liquid delivery, a switch is automatically thrown, opening an electrical circuit and cutting off simultaneously all liquid flow at the meter and all pumping action. The system includes an accessory control switch, a predetermining register and latch box



and quantity control valve—all installed at the meter. Where repeated deliveries of a fixed amount of liquid are required, a special factory-set predetermining register is available. This saves time on fixed-volume deliveries to barrels, mixing tanks, etc., by eliminating resetting of register after each run. Bulletin OG-327 gives more details. Meter and Valve Div., Rockwell Mfg. Co.

72—FRICTION TAPE offers superior adhesion

Among performance characteristics announced for Bull Dog Premium Brown Friction Tape are superior adhesion, high tensile strength, outstanding weathering, high dielectric strength and superior aging and non-ravelling. It is packaged in individual cartons with a transparent protective over-wrap. It is available in size No. 8, ¾ in. by 60 ft, 100 cartons per case. Boston Woven Hose & Rubber Co.

73—HEAVY-DUTY CASTER for loads to 5 tons

Designed for loads up to 5 tons per caster, the HX300 Series Super-Load Caster is heavily proportioned throughout with extra strength features at vital points. Timken tapered roller bearings and self-contained ballrace are incorpo-

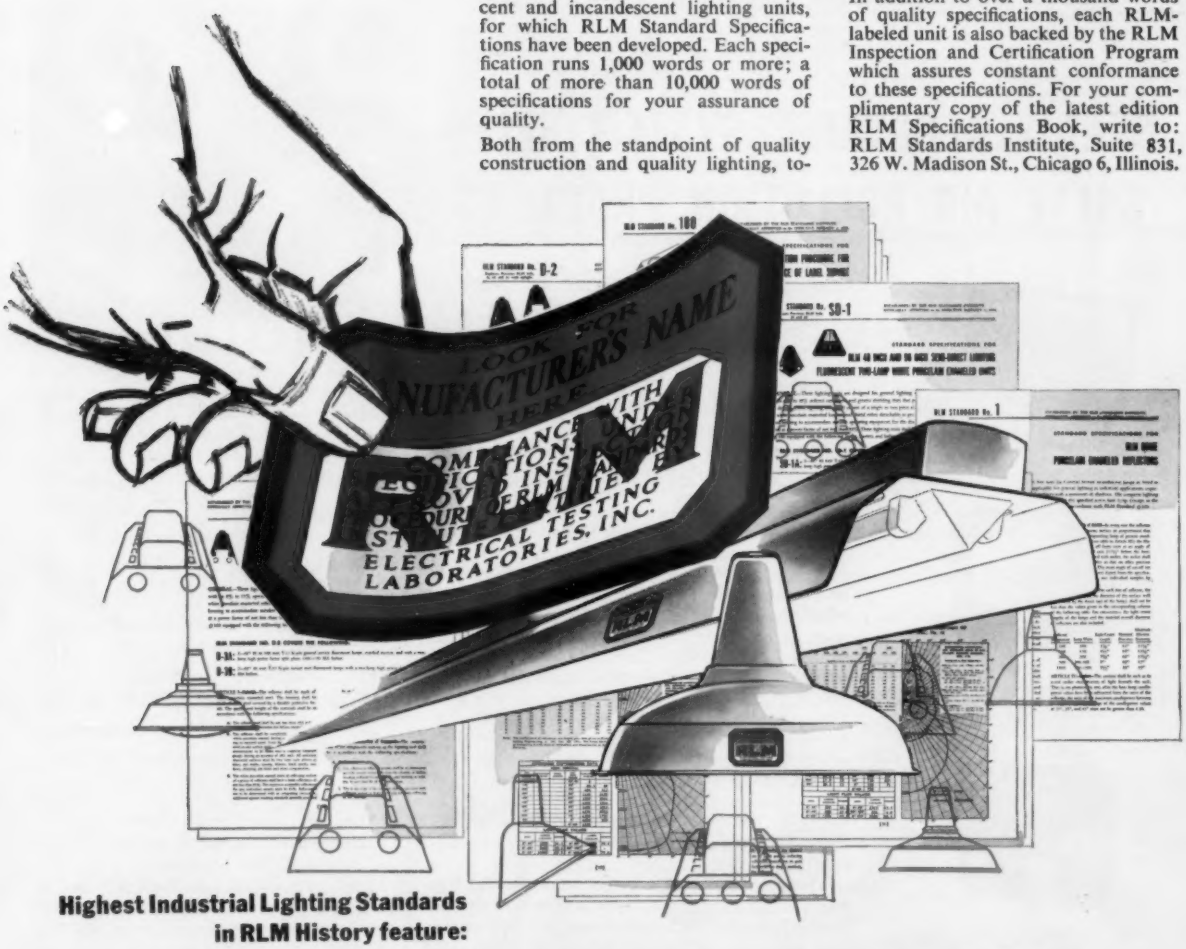
back of every RLM-Labeled Unit are 1,000 Words of Specifications

covering highest Industrial Lighting Standards in RLM History

Back of every RLM-labeled lighting unit is the assurance of over a thousand words of quality specifications. Each word is in accord with the basic, nationally-accepted minimum standards for industrial lighting equipment efficiency, design and performance. In all, there are 10 types of industrial fluorescent and incandescent lighting units, for which RLM Standard Specifications have been developed. Each specification runs 1,000 words or more; a total of more than 10,000 words of specifications for your assurance of quality.

Both from the standpoint of quality construction and quality lighting, today's RLM Specifications are the highest in history! The new RLM SD-1 standard for increased upward light, for example, calls for a fluorescent lighting unit with a 20% to 30% upward component to assure an important advancement in seeing comfort.

In addition to over a thousand words of quality specifications, each RLM-labeled unit is also backed by the RLM Inspection and Certification Program which assures constant conformance to these specifications. For your complimentary copy of the latest edition RLM Specifications Book, write to: RLM Standards Institute, Suite 831, 326 W. Madison St., Chicago 6, Illinois.

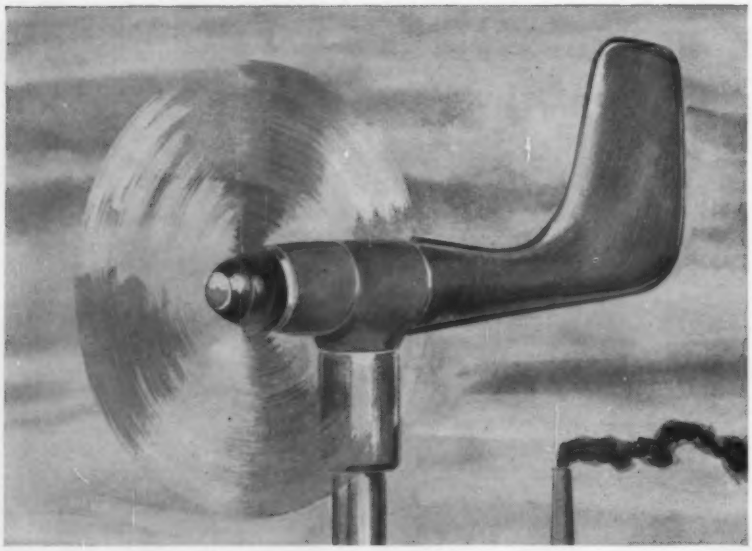


Highest Industrial Lighting Standards in RLM History feature:

Higher light output • Lower-cost installation
Better protection against glare
More seeing comfort • Easier re-lamping
Increased brightness control
Reduction of light loss
Safety from electrical hazards
Protection against rust and corrosion

RLM STANDARDS INSTITUTE
INCORPORATED
The letters R.L.M. stand for Reflector and Lighting Equipment Manufacturers

For more facts circle 637 on Reply Card



The Aerovane Transmitter detects wind speed and direction, electrically transmits data to indicator and recorder, and actuates control mechanism.

BENDIX AEROVANE* SYSTEM HELPS SOLVE AIR POLLUTION PROBLEMS

Indicator shows wind speed and direction. Calibrated in compass degrees and miles per hour.

Recorder inks wind speed and direction on time-calibrated chart. At normal setting, operates continuously for two-week period.

Optional indicator-controller reduces operating cost of blowers, deodorizers and scrubbers by providing automatic on-off control.

Here's how you can relieve air pollution problems in connection with your plant—and, incidentally, save your company endless headaches. The Bendix-Friez Aerovane System can be of tremendous value to you in eliminating costly and bothersome litigation, saving you money and building good public relations in the community where your plant is located.

If your stacks emit an odorous or possibly dangerous effluent, you must take steps to prevent it from harming personal health, crops or residences in the surrounding area. Bendix-Friez Aerovane System can help do the job as economically as possible.

Here's how it works. When winds are from an unfavorable quadrant, and blowing at velocities which indicate the likelihood of injurious fall-out, your Aerovane System goes to work. It actuates your blowers, deodorizers and scrubbers *only* when conditions require their use. At the same time, the Aerovane Recorder keeps a continuous and accurate, permanent record of *both* wind direction and speed. If litigation does develop, you'll have unquestionable evidence of wind conditions at any given hour.

In addition, the recorder provides an opportunity for the study of wind gustiness, an important factor in predicting the behavior of an effluent from a stack.

These are just a few of the reasons why you ought to investigate the Bendix-Friez Aerovane System if you have a factory-based pollution problem. Write today for full details. Bendix-Friez, 1474 Taylor Avenue, Baltimore 4, Maryland.

*REG. U.S. PAT. OFF.

Friez Instrument Division

Bendix AVIATION CORPORATION

For more facts circle 638 on Reply Card

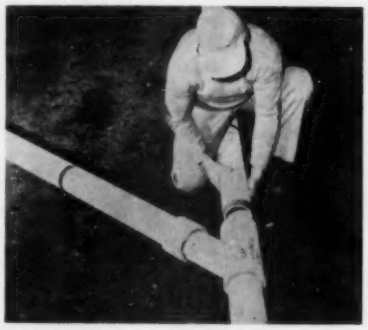
NEW PRODUCTS

(Begins on page 172)

rated to provide maximum swivel and rolling movement. Among other features announced are heavy 1-in. diam kingbolt, 5/8-in. thick steel top plate, 1/2-in. diam hardened balls, solid steel 1-in. thick lower top plate, and easy, fast lubrication through same sized pressure grease fittings, leading to the swivel and wheel bearings. Faultless Caster Corp.

74—SEWER PIPE, of durable asbestos cement

Most extensive use of this economical asbestos-cement building sewer pipe is expected to be in short length sewer hookups—as from building to municipal sewer lines. Manufacturer says this durable pipe will not corrode or rot and may be



expected to remain intact under the soil for an indefinite period of time. It is produced in 13-ft sections, which make possible fewer joints and lower installation cost. Half-size sections (6.5 ft) and asbestos-cement fittings can also be had. The pipe comes in 4- and 6-in. diam. Adjoining sections are readily joined by a special coupling designed to provide a close fit and prevent root intrusions into the pipe. The pipe is light in weight—a 13-ft section can be carried under one arm, it is noted—and one man can handle an installation unaided. Keasbey & Mattison Co.

75—ENCLOSED MOTOR designed for direct mounting

In the Type J, a totally-enclosed motor with facilities for direct mounting of driven equipment, alignment is provided by a totally-enclosed, NEMA Style C bracket with tapped holes for bolting from the driven equipment side. Designed to the new dimension standard of NEMA, the motor has more horsepower in less space; it comes in ratings of 1 to 30 hp. The shock resistant, cast-iron frame is heavily ribbed for strength and heat dissipation. A guarded fan propels air over the ribs to provide cooling as well as self-cleaning characteristics. A brass slinger serves to keep moisture from entering at the take-off shaft. Lubriflush lubrication is utilized.

The direct connecting feature is also

On the rear wall is the Alcoa Aluminum Bus Conductor system on still tanks and automatic plating machines in Z & W's plating department. Over $3,000 was saved in material costs alone.

$3,000 IN DIRECT SAVINGS

With Alcoa Aluminum Bus Conductor at Z & W Manufacturing

When Z & W Manufacturing Corporation designed their new 130,000 sq ft plant in Wickliffe, Ohio, they wanted equipment second to none—yet costs were closely watched. One of the best of the money-saving acts took place in their plating department.

After a detailed study, they used Alcoa® Aluminum Bus Conductor to carry the 12,000-amp load from individual rectifiers to the six plating lines. Compared to a copper system Z & W got the same conductivity from half as many pounds of metal. Only difference was a slight increase in size. In installing a system using high-conductivity aluminum alloy, Z & W estimates they saved more than $3,000 in direct material costs alone.

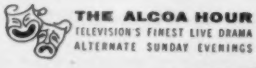
Easy fabrication and installation

Other important benefits and savings resulted from aluminum's light weight and easy handling. Also important was the ease of fabrication during their bending and drilling operations. The ½″ x 6″ bars were just bolted to 2 x 8's attached to the wall. Simple insulating washers and wood spacers were used.

Having some small copper bar stock on hand, they used that as leads in some places—other leads were aluminum. Trouble-free joints between copper and aluminum were made, as were all joints, with Alcoa Electrical Joint Compound and aluminum bolts.

Saves 50% on bus conductor

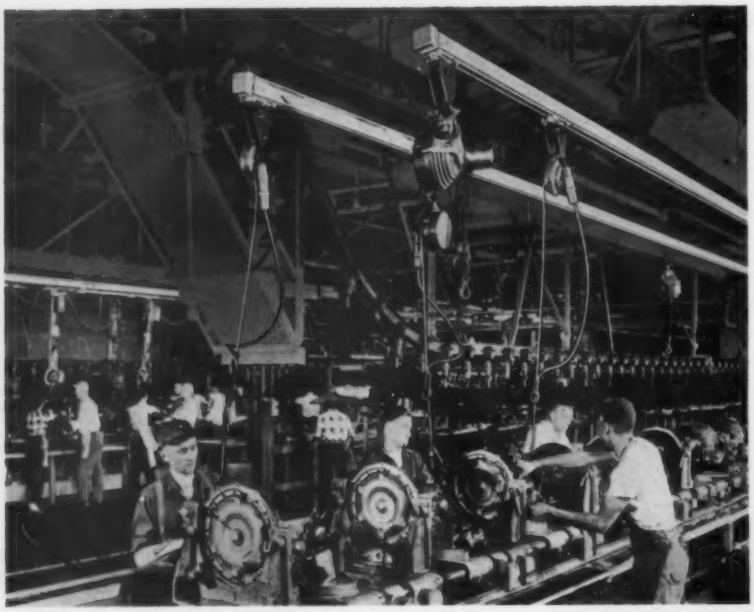
The same technical advice and assistance from Alcoa that enabled Z & W to engineer, design, fabricate and install this bus system are yours for the asking. Study how much you could save with Alcoa Bus Conductor—for expansion or modernization. Cost is about half. Just check the Yellow Pages of your phone book under "Aluminum" for Alcoa's nearest office. Or write, Aluminum Company of America, 2301-C Alcoa Building, Pittsburgh 19, Pa.



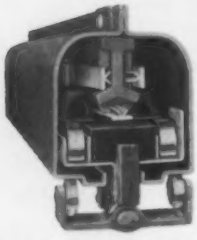
Your Guide to the Best in Aluminum Value

For more facts circle 639 on Reply Card

FEEDRAIL®



speeds up production by simplifying it!



Throughout industry, flexible Feedrail systems, in capacities from 60 to 500 amperes, provide convenient movable power sources for:

- Cranes and Hoists
- Production Lines
- Conveyor Assembly Lines
- Moving Test Lines
- Portable Tools
- Machine Tools
- Cutting and Sewing Rooms
- Lighting
- Motor Control

HERE'S HOW! Feedrail takes the costly time-wasting, dangerous cable *clutter* out of production lines by feeding power to portable tools and other electrical equipment through *mobile outlets overhead.*

Power is instantly available *anywhere* along the line. Long, power cables that get in the way and slow down production are eliminated. Employees can move about faster in complete safety. Result: *faster, safer production.*

Best of all, Feedrail "moving power systems" are surprisingly easy to install . . . can be quickly extended or relocated.

See how Feedrail in your plant can speed up production. Get full details. Write for Bulletin 51, Dept. P3.

SOLD BY MORE THAN 1,000 ELECTRICAL DISTRIBUTORS FROM COAST TO COAST

P7-1

Never Becomes Obsolete

FEEDRAIL CORPORATION

Subsidiary of Russell & Stoll Company, Inc.

125 BARCLAY STREET • NEW YORK 7, N. Y.

SPECIALLY QUALIFIED REPRESENTATIVES IN PRINCIPAL CITIES

For more facts circle 640 on Reply Card

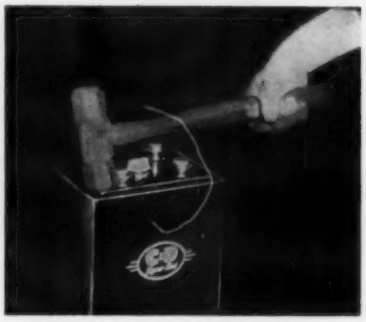
NEW PRODUCTS

(Begins on page 172)

announced for manufacturer's Type E Motors, explosion-proof models in Class I, Group D for protection against inflammable gases and volatile liquids, and Class II, groups F and G for operation in combustible dust atmospheres. U. S. Electrical Motors Inc.

76—BATTERIES feature rugged container material

Hi-Impac, a new material for industrial storage battery cell containers and covers claimed to virtually eliminate battery breakage, replaces present standard materials in this company's Slyver-Clad (R) line for industrial trucks and other uses.



As a result of using Hi-Impac, damage to battery cells from dropping, collision between trucks, or from impact of heavy objects falling on the battery, is practically eliminated, it is announced. Photo shows the no-damage effect of a 4-lb maul striking a cell with Hi-Impac container and cover. C & D Batteries, Inc.

Reader Service Cards on pages 257-258 make it easy to get further information on any of these products. Just circle the item numbers of the products you would like to know more about.

77—ANCHORS, for hollow walls, easy to install

Versatility, strength, compactness, easy installation—as well as the smallest size hole of any hollow wall anchor—are claimed for the Wing-Ding. It uses a standard ¼-in. drill. Wing-Dings are suggested for securing objects to hollow walls, floors, ceilings (wallboard or lath and plaster), composition board, glass, ceramic tile, plywood, sheet metal. They may be used to install electrical and plumbing fixtures in new or existing construction. They feature a one-piece, tripod design and positive tri-prong action, manufacturer notes; they install on ½-in. centers, need no special tools for installa-

▲ Power factor meter records Huyck & Sons' plant power factor. Maintaining high power factor with capacitors has meant savings on power bills for 25 years at the Rensselaer plant.

◀ James G. Armstead, maintenance engineer, and T. R. Butman, electrical foreman, inspect G-E capacitors installed at Huyck & Sons in 1931.

Since 1931 General Electric capacitors have saved money for F. C. Huyck & Sons

That's what James G. Armstead, maintenance engineer at F. C. Huyck & Sons, Rensselaer, N. Y., says about the first General Electric 5-kvar Pyranol* capacitors ever installed. According to Mr. Armstead, "These capacitors have been saving us money for 25 years."

In February 1931, F. C. Huyck & Sons, manufacturers of papermaker's felts and engineered fabrics for industry, installed 90 General Electric capacitors to improve power factor and increase system efficiency. To keep pace with increasing production, Huyck & Sons later added more G-E capacitors; their system now includes approximately 750 capacitor kvar.

The result of these capacitor applications has been an average plant power factor of 94 percent. Since Huyck & Sons has a kvar demand clause in its electric utility contract, this high power factor has meant monthly savings on power bills.

Mr. Armstead also pointed out the long life of the General Electric capacitors.

"We set up our equipment depreciation on a 20-year basis," he said. "These capacitors are now saving us even more money."

Even the original capacitors, during 25 years of service, have required very little maintenance. According to Mr. Armstead, "We inspect them from time to time to check the fuses—otherwise they just sit and save."

Perhaps capacitors can sit and save for you, too. If you use induction motors, check your power factor—or ask your G-E sales engineer to do it for you. Then check your utility power contract to see how much you will save by raising your power factor. You will be able to determine in advance how much you will save on power bills by installing capacitors. For more information on industrial power capacitors, write for bulletin GEA-5632, "How to Use Capacitors." General Electric Company, Section 441-43, Schenectady, N. Y.

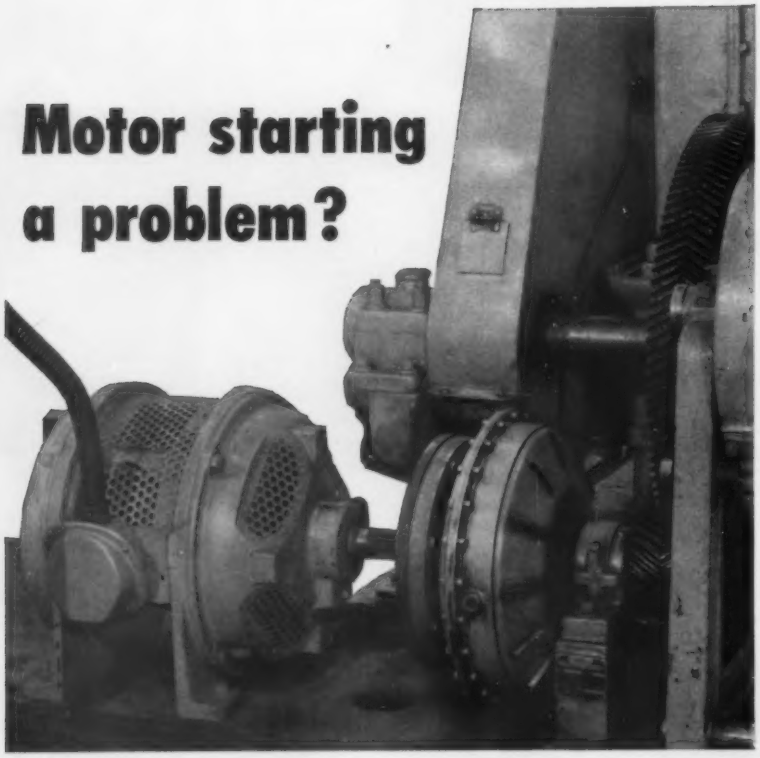
*Registered trademark of General Electric Co.

Progress Is Our Most Important Product

GENERAL ELECTRIC

For more facts circle 641 on Reply Card

Motor starting a problem?



Solve it with a Twin Disc Fluid Coupling!

Wilbur B. Driver Co., Newark, New Jersey, manufacturer of well-known TOPHET® and other electrical heat-resisting alloys, faced a typical motor starting problem. A 40-hp motor on a rolling mill, when started, caused lengthy voltage drop and dimming of lamps. The solution? Simple! A Twin Disc 17.5 Fluid Coupling was installed.

Results? Perfect! Not only was the voltage drop problem solved by the fluid coupling but the 40-hp motor was quickly replaced by a 25-hp motor because the excessive high starting current draw was greatly reduced.

The slip of the Twin Disc Fluid Coupling permits a motor to come up to speed immediately, picking up the load smoothly and gradually. High-starting current draw lasts only for the fraction of a second required for break-away current . . . and therefore motor selection can be based on running load rather than starting requirements. The coupling's fluid connection absorbs shocks and vibrations, making both driving and driven equipment last much longer.

Twin Disc Fluid Couplings are available in sizes 7.4S to 10.6 (small aluminum type) and 12.2 to 27 (large stamped steel type) . . . capacities from ¾ to 850 hp.

Try a Twin Disc Fluid Coupling. It can solve your power transmission problems. Write for Bulletin 144-D, Dept. DS, Twin Disc Clutch Company, Racine, Wisconsin.

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES

TWIN DISC
Fluid Couplings

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois

Branches or Sales Engineering Offices: Cleveland • Dallas • Detroit • Los Angeles • Newark • New Orleans • Tulsa

For more facts circle 642 on Reply Card

NEW PRODUCTS

(Begins on page 172)

tion and may be removed if necessary. Diamond Expansion Bolt Co., Inc.

78—FILLER CANS for use with oil and gasoline

These redesigned, galvanized steel filler cans feature a seamless-drawn dome-shaped shell with double-seamed bottom and no top or side seams. The dome-shaped shell prevents water and dirt from settling on top. The cans come in four sizes up to 5 gallon. Eagle Mfg. Co.

79—BEARING TESTER detects, measures wear

Resembling a portable radio in size and appearance and requiring no more skill to operate, this bearing tester can be used for preventive and plant maintenance or quality control, says manufacturer. It is designed to detect and measure wear in bearings, gears, spindles or slides without disassembly of machinery. On an assembly line it serves to assure precision

fitting of mating parts, such as gears. The instrument consists of a metal probe, or pick-up, connected by electric cord to a compact electronic amplifier with calibrated meter, loudspeaker, controls and, if desired, devices for making permanent records. Its power supply is any convenient electric outlet.

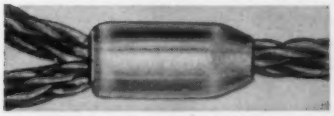
The tester operates on the principle that disturbances caused by parts malfunctioning are reflected as noise energy in the supporting bearings. The probe picks up this transient energy output, or friction loss from the relative movements of contacting parts. It senses both overall noise level and instantaneous noise changes, and these are shown visually on the meter. Sperry Products, Inc.

80—COLLECTOR gathers production data at source

The IBM Automatic Production Recorder, or APR for short, is designed to collect, correlate, store, and record data in punched tapes and cards even as the production process is underway. At the same time, reports are printed out on automatic typewriters located along the production line for use by supervisory personnel. The card-tape records, con-

Tuffy® Sling Bulletin

Reporting the Outstanding Performance of Union Wire Rope's Machine-Braided Wire Fabric Slings.

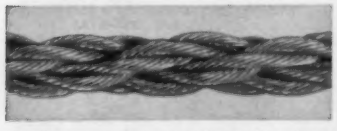


Streamlined Ferrules — Pressed On Over Tucked-In Splices — Give Tuffy Eyes Full Strength of Sling

It's on all Tuffy slings, and it doesn't cost you a penny extra. No sling ferrule like it anywhere! The ferrule is set on the eye splice under pressure so great that the eye splice has the full strength of the Famous Tuffy machine-braided wire fabric. It makes Tuffy slings stronger and safer. And still another advantage: because Tuffy slings are easier and safer to load, they're also faster to load. Yet Tuffy super-strong, super-flexible slings cost you no more than ordinary slings.

Hardly Ever Does a Kink Put a Tuffy on the Blink!

Try to kink a Tuffy sling — with all the force you can apply with two hands and the help of your feet. Chances are you'll need a vise. If you do succeed in putting a kink in that 9-part machine-braided wire fabric, you can straighten it out quickly and without materially damaging the fabric.



Tuffy Machine-Braided Wire Fabric — Successor to Wire Rope in Slings

Ordinary wire rope had the strength required for sling loads, but fell far short on the important qualities of flexibility, kink-resistance and ease of handling. Tuffy's patented 9-part machine-braided fabric combines super flexibility with extra toughness — costs no more than ordinary slings — and has uniformity of construction impossible to get in costly hand-braided slings.

Your Tuffy Distributor is Qualified to Help You Get More Service per Dollar from Slings and Hoist Lines

Send for FREE Tuffy Handbook of Slings and Fittings

For Canada, Safety Supply Co., Toronto

Distributors Fill Orders Fast on 16 Factory-Fitted Tuffys

Tuffy slings are factory-fitted, factory packaged and easy to order. They are delivered to you as a complete package — ready to go to work right now. Your distributor is ready to serve you, and he's backed up by his nearby Union Wire Rope depot.

No Complicated Specifications in Figuring and Ordering Your Tuffy Needs

Tuffys are tailored to special uses. Just select the Tuffy sling made for the type of load you're handling and (1) specify name — Tuffy; (2) specify type (U-1, U-2, etc.,); (3) specify diameter and length of fabric wanted. Special fittings are equally easy to order.

Tuffy Hoist Line Teams Up with Tuffy Slings

Tuffy Hoist Line is a special rope construction for hoisting on all types of over-head, stiff leg and mobile cranes, derricks and clamshells. Use it with Tuffy slings for a perfect working pair.

union Wire Rope **corp.**

2272 Manchester Avenue, Kansas City 26, Mo.

Specialists in high carbon wire, wire rope, braided wire fabric, stress relieved wire and strand

MY NAME_____ TITLE_____

COMPANY NAME_____

ADDRESS_____

2. CITY_____ ZONE_____ STATE_____

For more facts circle 643 on Reply Card

NEW PRODUCTS

(Begins on page 172)

taining such variables as weight, count, length, and temperature, together with related information identifying the product and process, are used as input to accounting machines. International Business Machines Corp.

81—LIFT TABLE for tool and die makers, holds a ton

Designed for tool and die makers, and plant maintenance departments, this small, battery-powered hydraulic lift table has a capacity of 2000 lb. The portable lift table is adapted from a mechanical hand crank model with a hydraulic ram replacing the threaded screw. The ram is powered by a battery hydraulic power unit, composed of a rotary gear pump with a 12-v d-c motor and two series connected 6-v, 130-amp hr, 19 plate batteries. It has a built-in 8 amp-hr trickle charger

with cut-out switch. Table deck is 26 by 43 in.; height range is from 28 to 42 in. at a lifting speed of 11 fpm. Table is raised and lowered by a "deadman" rocker type foot pedal. Running gear includes 6-in. diam semi-steel or molded plastic wheels, two swivel and two fixed. Unit has floor lock. The Colson Corp.

To receive product data circle item numbers on the handy Reader Service Cards provided on pages 257-258.

82—STUD ASSEMBLY cuts down maintenance costs

This removable ball bearing stud assembly is designed to cut maintenance and replacement costs on rolls and return idlers on belt conveyors. The conveyor roller shaft turns in ball bearings mounted in the removable studs. Only the bearing studs are required for emergency replace-

Big-time Cooling with small-time upkeep

Marley Double-Flow Aquatowers*

This trim trio of Double-Flow Aquatowers, with a specified capacity of 1800 gpm, has every big-tower performance feature of Marley's patented Double-Flow principle of water cooling — *plus* a unique flexibility and ease of maintenance that lend themselves ideally to industrial operations.

From every standpoint, these Double-Flow Aquatowers are a dream-come-true for the plant operator. He has complete control of cooling water for a sensitive process with widely varying cooling requirements because he can operate 1, 2, or 3 units at any part of rated capacity with full performance. Complete shutdown is never necessary. Rate and condition of flow are observable at a glance; regulation of flow is simple and positive. Mechanical equipment is immediately accessible for routine service, and the low-silhouette design is such that any service operation can be accomplished quickly and safely. Maintenance couldn't be simpler; flexibility couldn't be greater.

There's nothing like Marley's Double-Flow Aquatower for intermediate-capacity cooling if your plant requires sizable air conditioning, refrigeration or light industrial services. For information, see your Marley Engineering Sales Office in any of 55 cities, or write today for Bulletin DFAQ.

*U. S. Pat. No. 2776121 *Trademark Reg.

MARLEY

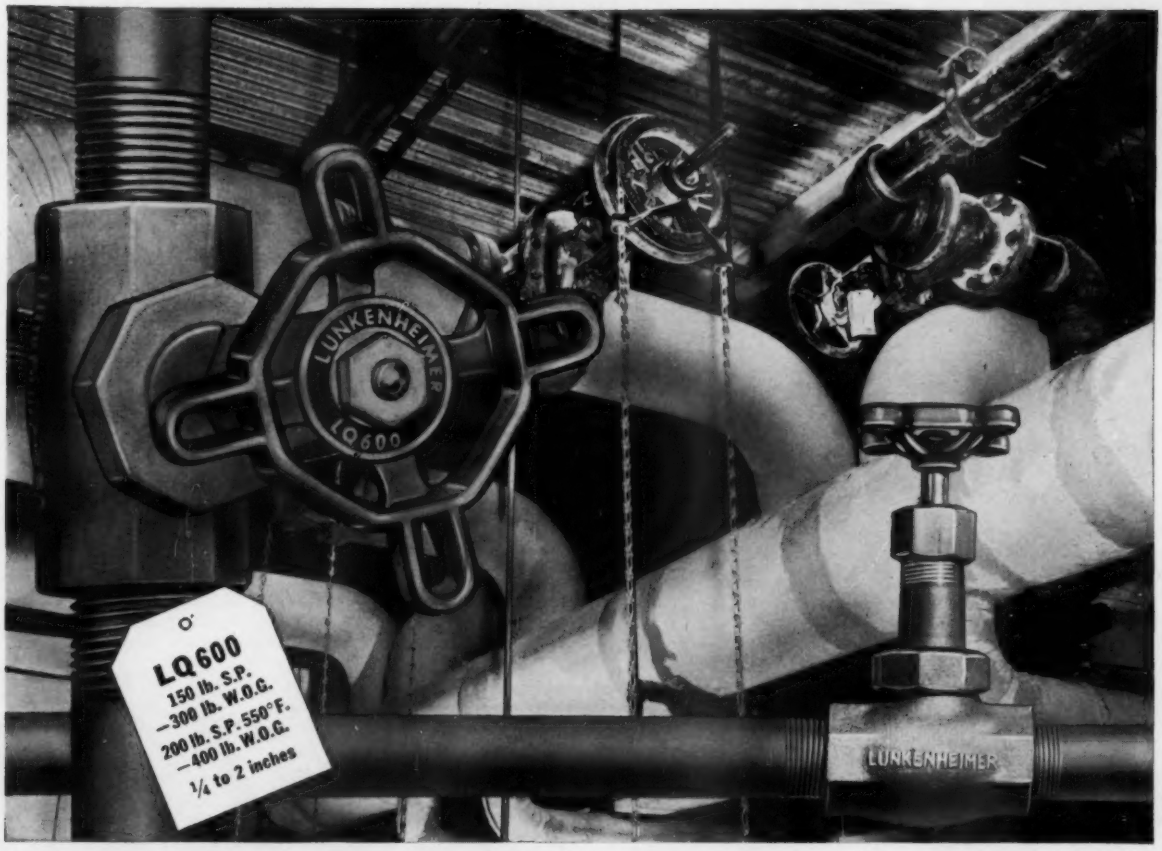
The Marley Company

Kansas City, Missouri

For more facts circle 644 on Reply Card

Today, maintenance often costs more than the equipment itself!

You Can't Afford Less than the Best



What's happened to maintenance costs? That's a question you hear time and again in management-maintenance meetings these days. Costs are up sky-high and labor rates are still rising. The minute you touch a wrench to a valve, its cost can more than double! You can't do anything about the labor costs, but you can cut maintenance expense to rock-bottom by installing the one bronze globe valve that's handwheel-and-bonnet above all others . . . the LQ600, by Lunkenheimer. Thousands of these valves have served without maintenance for five years and more—many on the toughest throttling services industry can offer. The secret? Exclusive Brinalloy* seats and discs—harder than 500 Brinell Stainless! Insist on LQ600 Valves to help solve your number-one problem . . . sky-high maintenance expense. The Lunkenheimer Co., Box 360, Cincinnati 14, Ohio.

The cost of a LUNKENHEIMER VALVE
Gets smaller... and smaller... and smaller...
with each passing year of dependable service

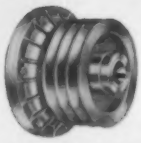
**Patented alloy—T.M. Reg.*

L-157-15

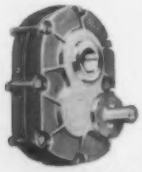
LUNKENHEIMER QUALITY

LUNKENHEIMER®
THE ONE *Great* NAME IN VALVES

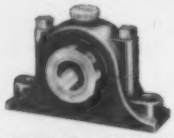
For more facts circle 645 on Reply Card



FLEXIDYNE
THE DRY FLUID DRIVE
100% efficiency at full load!



TORQUE-ARM
SPEED REDUCERS
Cost less—deliver more!



DODGE-TIMKEN
America's Quality Pillow Blocks!

●

DODGE BULLETINS YOU SHOULD HAVE—

- Flexidyne Dry Fluid Drives and Couplings. Bulletin A-640-A.
- Torque-Arm Speed Reducers. 15 sizes—1 to 90 hp. Bulletin A-637.
- Roller Bearings. Load ratings, dimensions, etc. Bulletin A-638.

Write for your copies.
DODGE MANUFACTURING CORPORATION
2700 Union Street • Mishawaka, Indiana

DODGE
Mishawaka, Ind.

For more facts circle 646 on Reply Card

NEW PRODUCTS

(Begins on page 172)

ment, it is noted, and all maintenance is done at the conveyor—rollers remain on the job. Sizes of rollers, complete with studs, carried in stock include diameters from 2⅜ in. to 4 in., in lengths from 12 to 36 in. Bearings, Inc.

83—STEAM VALVE responds to reduced pressure changes

Standard Type 44 Valve, a pressure reducing and regulating valve for steam service, featuring built-in pilot and main valve strainers, is a single seat, internal pilot-operated, piston-actuated model, reported to be responsive to the smallest changes in reduced pressure. The strainers reduce maintenance to a minimum over long periods of service, accord-

ing to manufacturer, and are easily removable for cleaning or replacement without removing valve from line. Maximum inlet pressure is 250 psi at 400 F, and delivery pressures range from 5-250 psi. Valve is also available with external sensing line. Sizes are 2, 2½, 3 and 4 in. with iron body and flanged ends. Bulletin 981 gives details. A. W. Cash Co.

84—CABLE CUTTER offers speed and accuracy

Solid construction of this cutter is claimed to make it particularly advantageous where heavy wire has to be cut

with speed and accuracy. Manufacturer says no special skill is required to operate it. Heat-treated, replaceable steel blade and dies are used to assure maintenance of the cable's original shape after cutting, and to leave the cable end free of jagged wire and ready for further operation. The cutter accommodates cable or wire rope up to ⅞ in. diam. The Chicago Screw Co.

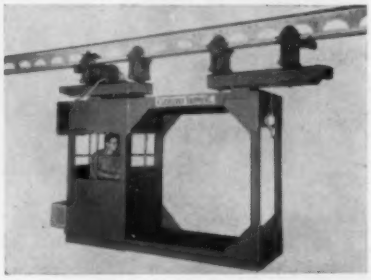
85—RIGHT ANGLE DRIVE for boiler tube expanding

This heavy-duty right-angle gear drive, for boiler tube expanding, utilizes roller

bearings to minimize friction, it is pointed out, and therefore cuts down power losses through the unit. Its outer case is forged steel. The new drive is available in ½-, ¾- and 1-in. sizes. Lagonda Div., Elliott Co.

86—TRAMRAIL CARRIER for overhead handling

Although designed especially for conveying ladles of hot metal for die casting, the platform of this tramrail carrier can be changed in size and adapted for other

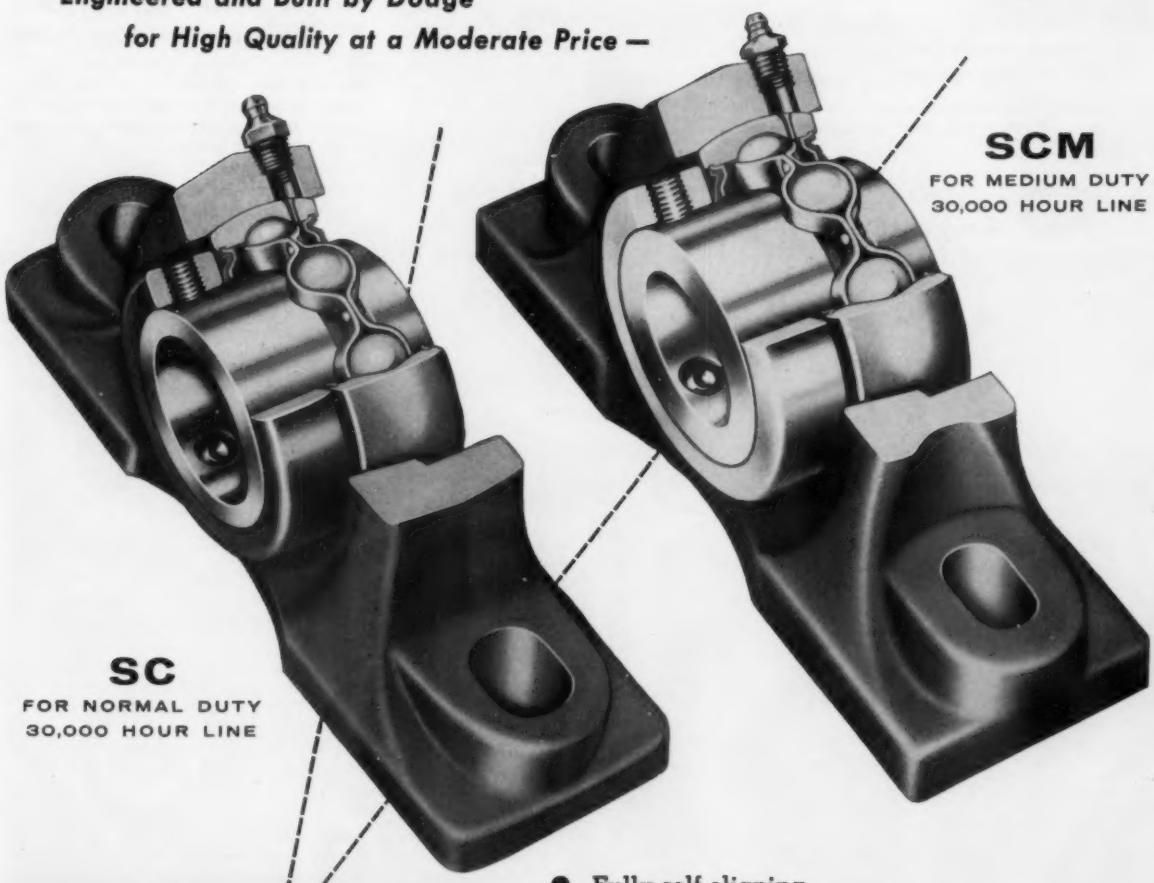


handling purposes. The carrier illustrated has a cab enclosed with aluminum paneling and is provided with air-conditioning to keep the operator comfortably cool while transporting molten metal. The door has a safety switch to prevent carrier from being moved when the door is open. The unit has a capacity of 3100 lb, travels at speeds up to 300 fpm. Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.

87—SINGLE HOSE REEL is easily installed

Model A-1 Single Hose Reel features a recently designed swivel, using chevron type seals with stainless steel spindle, rotating on sintered bronze graphite bearings to assure leak-proof handling of gases. The reel handles ¼-, ⅜- or ½-in. ID hose on the spring wound drum with a locking pawl device for

Engineered and Built by Dodge
for High Quality at a Moderate Price —



SCM
FOR MEDIUM DUTY
30,000 HOUR LINE

SC
FOR NORMAL DUTY
30,000 HOUR LINE

The Seal *Won't Blow!*

- Fully self-aligning.
- Rugged one-piece housing.
- Fully assembled and pre-lubricated at the factory.
- Sealed both on and off the shaft.
- Metallic backed synthetic rubber seals keep lubricant in, dust and dirt out. Engineered to stay put—*the seal won't blow!*
- Pillow block and flange cartridge types.
- Available from distributor stocks—SC in shaft sizes from 3/4" to 2-7/16"; SCM from 1-7/16" to 3-7/16".
- Write for bulletin complete with tabular data, engineering drawings, dimensions, weights, and radial load ratings.

Call the Transmissioneer, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable assistance on new, cost-saving methods. Look for his name under "Power Transmission Machinery" in your classified telephone directory, or write us.

DODGE MANUFACTURING CORPORATION
2700 Union Street, Mishawaka, Indiana

DODGE
of Mishawaka, Ind.

For more facts circle 647 on Reply Card

NEW PRODUCTS

(Begins on page 172)

easy release to retract hose into reel. The unit has universal type mounting brackets. United Specialties, Inc.

88—HOLDING DEVICES afford greater electrical safety

Hub-Lugs are announced as providing a simple, quick fastening method which assures a moisture-proof, stronger, and more durable method of fittings in electrical control and operating systems on machinery. To apply, you place the Hub-

Lugs over conduit, attach required fittings to conduit, slip Hub-Lugs back down over hubs on fittings, tighten with an Allen wrench, then secure fittings to machinery through holes in wings of Hub-Lugs. It's not necessary to drill and tap holes in the fittings for fastening them with this method, manufacturer points out. Ideal-Simplet Fittings, Inc.

E. R. P. CATHODIC PROTECTION . . .

individually designed for each application

An effective installation that operates at the lowest cost per year requires experienced engineering evaluation of site and environmental conditions. The Electro Rust-Proofing Engineering Division makes available to you the cumulative experience gained in designing more than 10,000 cathodic protection systems.

Electro Rust-Proofing can furnish any one, or all, of the following services to help you provide proper cathodic protection for each of your jobs:

- Corrosion surveys and recommendations
- Design based on engineering experience
- Cathodic protection equipment and installation
- Service to assure proper operating results

For additional information write today.

ERP CATHODIC PROTECTION SINCE 1935

ELECTRO RUST-PROOFING CORP.

A SUBSIDIARY OF WALLACE & TIERNAN INC.

30 MAIN STREET, BELLEVILLE 9, NEW JERSEY

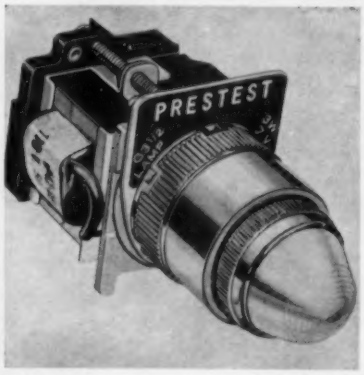
CABLE: ELECTRO, NEWARK, N. J.

E-35R

For more facts circle 648 on Reply Card

89—OIL-TIGHT PUSHBUTTONS offered in two new types

The Roto-Push is announced as an operator unit combining functions of a single button station with advantages of a two- or three-position selector switch. Contacts are maintained or momentarily operated by turning the guard ring, depressing the button, or a combination of both. Another pushbutton being introduced by this manufacturer is the Pres-Test, an indicating light designed to



provide a simple means of checking indicating lights without disturbing the control circuit and without removing a lens or bulb.

This line of pushbuttons offers a back-of-panel depth of only 1-$\frac{33}{64}$ in. for transformer types, 1⅞ in. for resistor units. They come in key-operated, selector switch, flush button, mushroom head or knob-operated models, each with Neoprene-diaphragm seal. Contact blocks are divided into two isolated compartments with individually operating plungers and circuits which can be both normally open, both normally closed, or one normally open and one normally closed. Three of these blocks can be so arranged as to provide almost unlimited circuit flexibility. Publication EL-178 provides data. Cutler-Hammer, Inc.

90—DECADE COUNTERS for low power operation

Operating from a plate supply of only 150 v d-c at 7.5 milliamperes from 0 to in excess of 100 kc, the 100L Series Low Power Decade Counting Units include models for pulse, analog, or binary output. They are designed to be physically and electrically interchangeable with most existing low power decade counters and are said to offer superior performance and reliability when used as replacements. Specifications include: direct readout in decimal numbers; counting rate in excess of 100,000 pulses per second; pulse pair resolution, 5 microseconds approximate. Computer-Measurements Corp.

91—SLIDER BOARD UNITS for smooth conveying

Slider board belt conveyors suitable for conveying materials over horizontal distances up to 300 ft, and yet providing smooth travel with minimum friction re-

How to Get More Work Out of Steam Heated Equipment

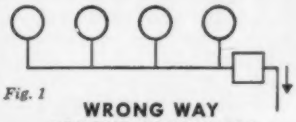


Fig. 1

WRONG WAY
"GROUP TRAPPING"

• One trap drains a group of steam condensing units. This causes "short-circuiting," entrainment of air, low and erratic temperatures. Ask for Bulletin 825 for complete details.

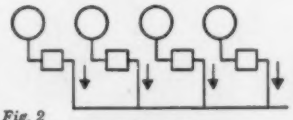


Fig. 2

RIGHT WAY
"UNIT TRAPPING"

• One trap drains *each* steam condensing unit. Condensate *and air* are removed as fast as they accumulate. This assures top temperatures and peak performance all the time.

Example: Armstrong "Unit Trapping" Increases Wood Core Press Production 20%

If, anywhere in your plant, you have more than one steam heated machine—or coil, chest or roll of a machine—being drained by a single steam trap, give a listen to this:

Mr. Dominic Reali, plant engineer at the Stanley Company, Stanley, Wisconsin, was faced with glue joint failures on wood veneer coming off a platen press. The press was group trapped (Fig. 1) when he took over. Platen temperatures were erratic and production was inadequate.

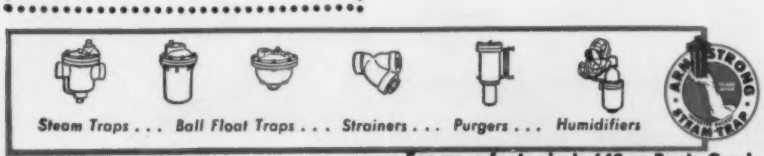
What did Mr. Reali do? He called an Armstrong Representative to help him select a trap for *each* platen of the press. (Fig. 2)

Now, press production is up 20% and glue joint failures are just a memory.

It doesn't matter whether you operate platen presses, jacketed kettles, unit heaters or what, the principle is the same. Armstrong *unit trapping* always makes equipment perform better.

GET COMPLETE DETAILS . . . Armstrong Bulletin No. 825, "Preventing Short Circuiting of Steam" tells the how and why of "group trapping" versus "unit trapping," explains what happens in steam condensing units. Free on request to your local Armstrong Representative, or:

ARMSTRONG MACHINE WORKS
9123 Maple St. • Three Rivers, Michigan



ARMSTRONG STEAM TRAPS

For more facts circle 649 on Reply Card

(Begins on page 172)

sistance are announced as available in two standard sizes: 16 and 20 in. wide. They are reported to provide gentle handling of fragile materials, have low power requirements and large capacities, to handle travel up and down slopes. They can be reversed to carry in either direction.

Manufacturer says these conveyors will handle practically any material not containing large lumps, and are particularly suited for materials that many types of conveying units would break or fracture —as dry cereals and soap chips. The slider board can be used under bins and other types of containers, or used as an inspection table.

The unit consists of an endless belt operating on a smooth sheet metal trough located between head and foot pulley terminals. The belt can be of any material required for the application. The slider board is enclosed between skirt plates extending the length of the conveyor. This trough-like arrangement can convey materials openly, or a weather-tight cover can be provided. The conveyor is designed to maintain proper belt tension, and alignment of head and foot shafts, so belt cannot ride to either side of trough. All points are accessible for cleaning. Standard drive arrangement is an 1800-rpm motor of required horsepower driving to a shaft mounted torque arm speed reduction unit through a guarded multiple V-belt drive. Bulletin 175 gives details. Sprout, Waldron & Co., Inc.

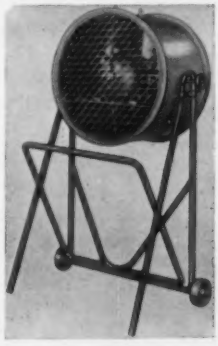
92—PARTS CLEANER fits the standard size containers

The Air-Push Spragit is announced as an air operated tool which automatically speeds cleaning small parts. It works

with any immersion cleaning fluid and is readily adapted to the cover of any standard 5- or 10-gal. container. The unit is designed to agitate basket furnished with fluid without breaking cleaning fluid evaporation seal. It operates on as little as 12 lb of air, company states, and automatically shuts off when lifted from can. Featuring an adjustable stroke, it is of all metal construction. Sprague Devices, Inc.

93—PORTABLE FAN can be anchored down

This portable man-cooling fan can be anchored to the floor for permanent installation or moved into desired position on steel wheels. Known as Type P, the axial-airfoil fan is available in 24-in. through 48-in. sizes. It is suggested for industrial operations requiring a sturdy



fan for dissipation of hot air and fumes. A swivel mounting permits the air blast to be directed either up or down in a 90-deg arc. The fan is also adaptable to cooling and drying functions.

Aerodynamic hub and blade design is stressed as an important feature of the Type P. The hub is larger than on many

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CONTINENTAL CAN CO.

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NEW PRODUCTS

(Begins on page 172)

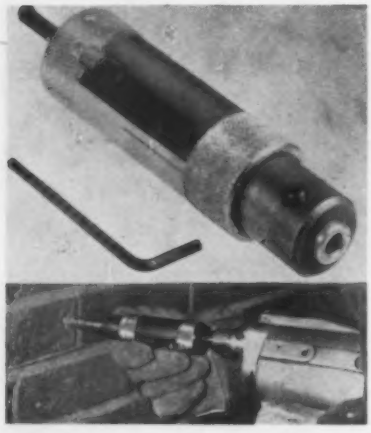
fans and the blades are wider, with a thick, hollow airfoil section. Blade angles are large at the hub and decrease to smaller values at the tip, providing a blade design similar to that of an airplane wing. Hub diameter varies from 25 to 70 per cent of the wheel diameters, and is approximately equal to the diameter of the motor.

The fan's new hub-tip ratio produces pressure near the hub equal to that against which the unit as a whole is working, the company points out. This eliminates back flow and partial stalling. In addition, the wider blades are said to produce higher pressure and keep noise level low.

The fan assembly is of heavy welded steel with totally enclosed, ball bearing motor. The fan is available with two, four, six or eight steel or aluminum blades, depending on intended function. Detroit Blower Corp.

94—IMPACT ATTACHMENT for masonry hole drilling

Pneumatic impact action for high-speed drilling in concrete, brick and masonry can be obtained with any ¼-in. electric drill by means of this rotary impact attachment, it is announced. Called Hammerin' Hank, the attachment is 6 in. long, 1½ in. diam. It is claimed able to drill ½ in. holes, 3 in. deep in concrete



within 30 sec. It uses a 25-lb pre-loaded spring and two rotating cams to provide two blows per revolution. Manufacturer says it develops about 90,000 ft/lb per minute impact force.

The unit is suggested for use in electrical and plumbing construction and general maintenance work, due to its power, compactness and light weight (1½ lb). According to company, high drilling efficiency can be obtained with 15-lb pressure, which makes the unit adaptable for close-quarter work and on ladders where it is difficult to apply greater pressure. Hammerin' Hank can be chucked into any standard carbide drill, including ¼- to ⅞-in. sizes. The standard collet takes a ½-in. drill shank, and sleeve bushings are provided to take ¼- and ⅜-in. shank diameters. This attachment costs around $16.00. Power Tools Corp.

95—COUNTER for pneumatic transmission systems

This remote integrating counter for use with pneumatic transmission systems is a seven-digit unit which receives its signal from a measuring transmitter operating on an impulse duration system. Since the electric signal transmitted is a function of time, line voltage variations are said not to affect the accuracy of the counter. The counter is housed in a small flush mounting case for use near a pneumatic recording or indicating receiver on a panel board, or in whatever location its use would prove most valuable. Bulletin A128 gives additional details. The Bristol Co.

96—FEED WATER REGULATOR is balanced flow type

The Type P, a balanced flow, feed water regulator for high-duty steam generators is designed to match feed-water input to steam output, regardless of load conditions, and to hold drum level within close limits, despite changes in load or feed-water pressure. Control is modulated by three influences — drum-water level, feed-water flow and steam flow. According to company, the two flow influences are obtained from primary elements of flowmeters. Each acts on a force-balance transmitter which sends an air impulse to a balancing (combining) relay.

Transmitters can be mounted without regard to each other, it is noted, because they are not mechanically linked. Drum-level impulse to balancing relay is sent out by a pressure-compensated pilot operated by a thermostatic tube. A slider adjustment on each transmitter permits modifying the output range to give a rising, lowering or practically constant drum water-level characteristic. Balancing relay permits either bias adjustment or 1-to-1 combining of three control influence. The system can have diaphragm or piston operated control valves having ports to match various plant operating conditions. Almost any desired opening or closing force can be provided. The auto-manual control station permits remote manual control of feed valve. Having no "seal" position, transfer from manual to automatic is fast and bumpless, company notes. Copes-Vulcan Div., Blaw-Knox Co.

It's easy to obtain product data with the postage-free Reader Service Cards provided on pages 257-258. Use them for information on advertised products, too. Just circle the key number appearing at bottom of the ad.

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COLUMBUS, Santelier Brothers
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KANSAS CITY, Kelley Asbestos Co.
LITTLE ROCK, Gunn Distributing Co.
LOS ANGELES, Western Fibrous Glass Products
Thorpe Insulation Co.
LOUISVILLE, General Insulation & Roofing Co.
MADISON, Wis., J. D. Wilson Co.
MEMPHIS, John A. Denie's Sons Co.
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MILWAUKEE, J. D. Wilson Co.
MINNEAPOLIS, Asbestos Products, Inc.
MOBILE, Ala., Shook & Fletcher
NASHVILLE, Southern States Iron Roofing Co.
NEWARK, N. J., Eastern Steam Specialty Co.
NEW HAVEN, Conn., Insulation Supply Co.
NEW ORLEANS, Eagle Asbestos & Packing
NEW YORK, Eastern Steam Specialty Co.
OKLAHOMA CITY, Ball Distributing & Engineering Co.
OMAHA, Cardinal Supply & Mfg. Co.
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PHOENIX, Ariz., Kircher Asbestos & Rubber Co.
RALEIGH, N. C., Southern States Iron Roofing Co.
RICHMOND, Va., Southern States Iron Roofing Co.
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With a knife and sections of Snap*On, you can make big fittings quicker than you can say "one-piece pipe insulation molded of fine glass fibers". It is easy to see that you can save time and effort with these unique flexible fitting sections that just snap on the pipe . . . even in tight places. Other reasons why you will prefer Snap*On for hot or cold piping:

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See Adjoining Column for Local Snap-On Distributor

For more facts circle 652 on Reply Card

48 Automatic Dockboards

(Continued from page 101)

the dockboard. The backing truck contacts the operating arms and the lip of the dockboard is brought down to the bed as the truck contacts the dock. When the truck pulls out, the dockboard automatically rises back into a raised position, ready for the next carrier. The big advantage with these dockboards, besides their simple construction, is the fact that no dock attendants are needed to operate these units during the arrival and departure of carriers.

Another advantage is the cross traffic lock system. A load of 100 lb or more on the ramp surface will automatically lock the dockboard flush with the level of the dock. This provides for traffic across the width of the dock and allows for a greater area of the dock to be available for traffic when the dockboards are not in use.

In new construction, as in the Ford Terminal, or for rebuilding existing dock facilities, recessed models are usually specified. These models require pits the size of the dockboard to be recessed into the dock. The dockboards are supplied complete; set-up and installation can be easily done by average plant maintenance or contractor personnel. Automatic dockboards are also available for use in front of existing dock facilities. These dockboards are the same as the recessed models supplied to Ford, with the exception of being a complete "package," designed for location in front of the present dock.

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Welding, cutting, shearing, punching, etc., leave exposed surfaces where rust has a chance to begin. If this work is done before Hot-Dip Galvanizing there will be no exposed surfaces. That's why we say—have your products Hot-Dip Galvanized after fabrication and there will never be a weak spot in your finished product.

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For more facts circle 653 on Reply Card

Masonry Protection With Silicones

(Continued from page 103)

which are the most popular. The application may be done by brush, roller or spray at a rate of 75 to 100 sq ft per gallon. Dense structures which cannot accept the solution at that rate may be covered at a rate of 200 sq ft per gallon in each of two coats.

Use of low pressure spray with a pressure of not more than 10 psi is the preferred method. Because of the high solvent concentration, precautions should be taken against fire and to protect the operator from breathing toxic fumes.

Water-based (sodium methyl siliconate) silicones may be used in spray equipment used for any other aqueous fluids or applied by brush or roller. However, they must be handled with the same precaution as strong alkali and the body should be completely covered if the spraying technique is used. Although not as versatile as the more popular solvent based materials, the water-based silicone repellents may be successfully applied to damp surfaces. Tests have also shown sodium methyl siliconate is the only silicone material which can make limestone water repellent.

Inasmuch as silicones form a thin film in masonry pores and capillaries, they cannot work effectively by themselves on large aggregate materials. In such cases, the silicone treatment should be preceded by a masonry cement paint to reduce size of surface openings.

Silicones provide a colorless film, and may be applied over any type of colored surface. They will not discolor any surfaces where overspray or splashing occurs during application. They may also be used as an undercoat for all types of oil or water-based decorative finishes, or as additives to upgrade the performance of such finishes.

Perhaps unknowingly, some plant engineers already have benefited from silicone performance on such items as asbestos shingles, pipe insulation materials, and gypsum. There has also been use of silicone sprays on freshly laid concrete to obtain slower, more even cures.

Another new use which may be of

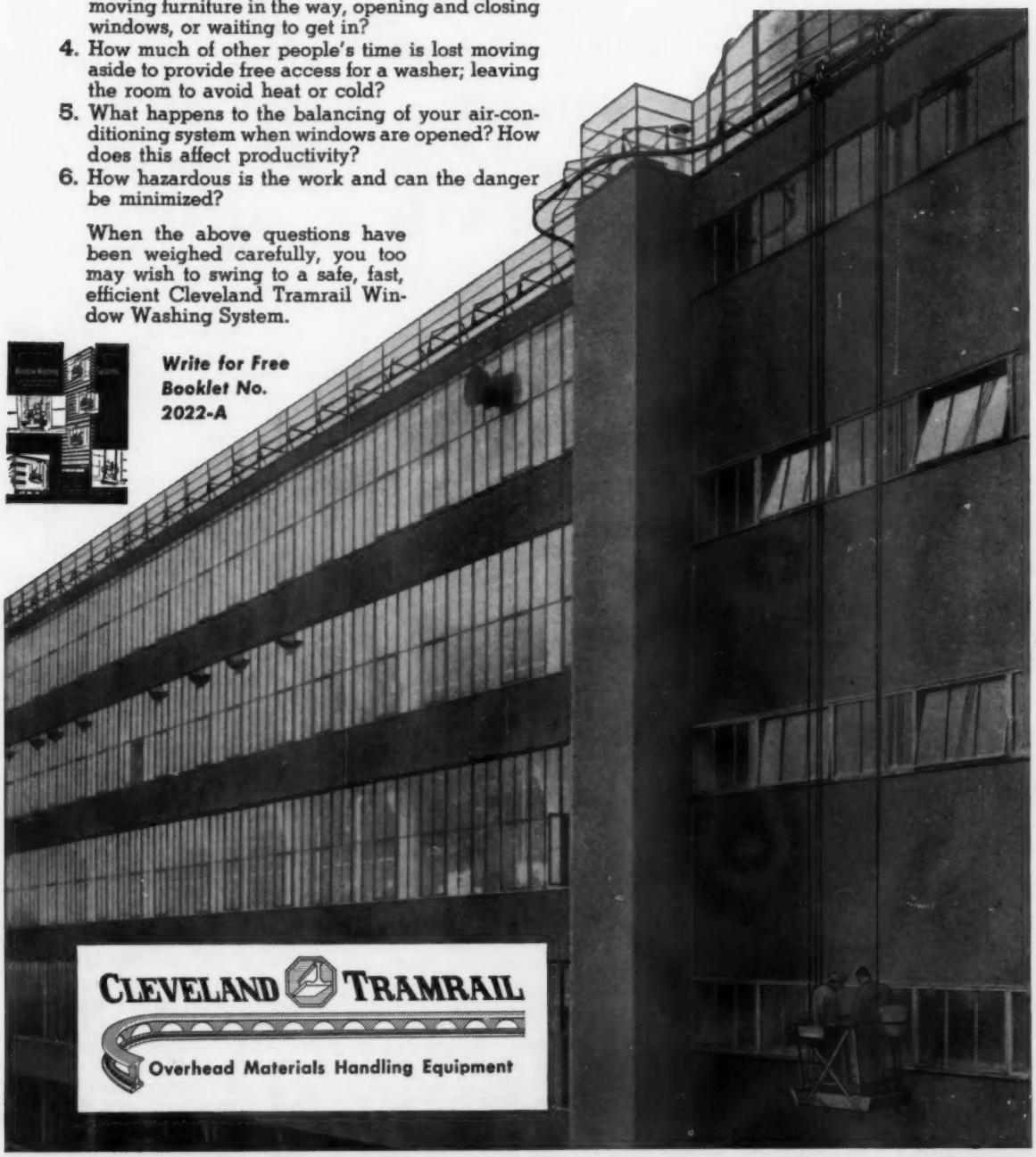
Ponder these Questions
ON WINDOW WASHING

1. How many square feet of glass can a man wash per day?
2. When working from the outside, how much time is lost in reaching windows?
3. When working from the inside, how much of a washer's time is lost enroute from office to office, moving furniture in the way, opening and closing windows, or waiting to get in?
4. How much of other people's time is lost moving aside to provide free access for a washer; leaving the room to avoid heat or cold?
5. What happens to the balancing of your air-conditioning system when windows are opened? How does this affect productivity?
6. How hazardous is the work and can the danger be minimized?

When the above questions have been weighed carefully, you too may wish to swing to a safe, fast, efficient Cleveland Tramrail Window Washing System.

Write for Free Booklet No. 2022-A

A Cleveland Tramrail Window Washing System enables one or two men to reach and clean entire walls of windows with safety. The special cage is suspended from an overhead carrier that travels on a track attached to the building. This equipment is also helpful for pointing up, painting and minor repairs.



CLEVELAND TRAMRAIL

Overhead Materials Handling Equipment

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interest is the application of silicones to concrete flooring and supports for machinery on which water-based cutting oils are used. The silicones not only protect concrete against degradation caused by continual absorption of water but makes for better housekeeping because the anti-stick properties of the silicones minimize the adherence of dirt, dust, oil, chips, and other foreign matter.

Increased interest is being shown in the use of silicone based paints for protecting "hot" equipment such as boilers, furnace and oven exteriors, smoke stacks, piping, mufflers, chemical plant equipment and motors. Silicone aluminum coatings have shown outstanding performance at temperatures up to 1000 F. even in the presence of flue gases. At lower temperatures, on the order of 550 F and sometimes higher, silicone colored finishes have proved both decorative and effective.

Is Pump Performing at Capacity?

(Continued from page 123)

the pumps but with some reduction in power consumption.

Question: We purchased a centrifugal pump designed to handle 1000 gpm against a total head of 225 ft made up of a suction lift of 15 ft and a discharge head of 210 ft. The pump delivers only 700 gpm. The manufacturer advises us that we failed to mention that the pump would be installed at an elevation of 5200 ft above sea level. How does this factor affect the pump capacity?

Answer: An outside source of pressure over and above the liquid vapor pressure must be available to cause liquid to flow into a centrifugal pump impeller. When a pump takes liquid from a source below its centerline, the atmospheric pressure provides this energy. The atmospheric pressure at sea level is 33.9 ft absolute and if we deal with cold water at 62 F (vapor pressure = 0.6 ft), the net energy available over and above the vapor pressure is 33.9 — 0.6 = 33.3 ft.

If the pump is installed so that the suction lift is 15 ft, there remains 33.3 — 15 or 18.3 ft of energy above the vapor pressure to cause flow into the impeller. This is termed the available NPSH or net positive suction head, and must be equal to or greater than the NPSH required by the pump for the intended capacity. In this case, it would appear that the pump selected had a required NPSH of about 18 ft.

If the pump is installed at some elevation above sea level, it will still

require 18 ft NPSH, but the atmospheric pressure will have been reduced and, therefore, so will the available NPSH and the pump will be able to handle less suction lift. The atmospheric pressure is reduced by approximately one inch of mercury per 1000 ft of elevation. At 5200 ft, the atmospheric pressure will therefore be approximately 6 ft less than at sea level. The available NPSH will therefore become (33.9 — 6) — 0.6 — 15 or 12.3 ft and the pump will be unable to handle the required 1000 gpm.

If it is desired to handle 1000 gpm with this pump, it will be necessary to reduce the suction lift by the amount of the reduction in atmospheric pressure, that is, to 9 ft.

Let us solve your pumping problems

When you have a "liquid materials handling" problem, you want to be sure of selecting the best pumping equipment available for your installation.

The Blackmer organization is ready to review your applications and make rotary pump recommendations that may save you a great deal of unnecessary expense and headaches.

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"liquid materials handling"® equipment

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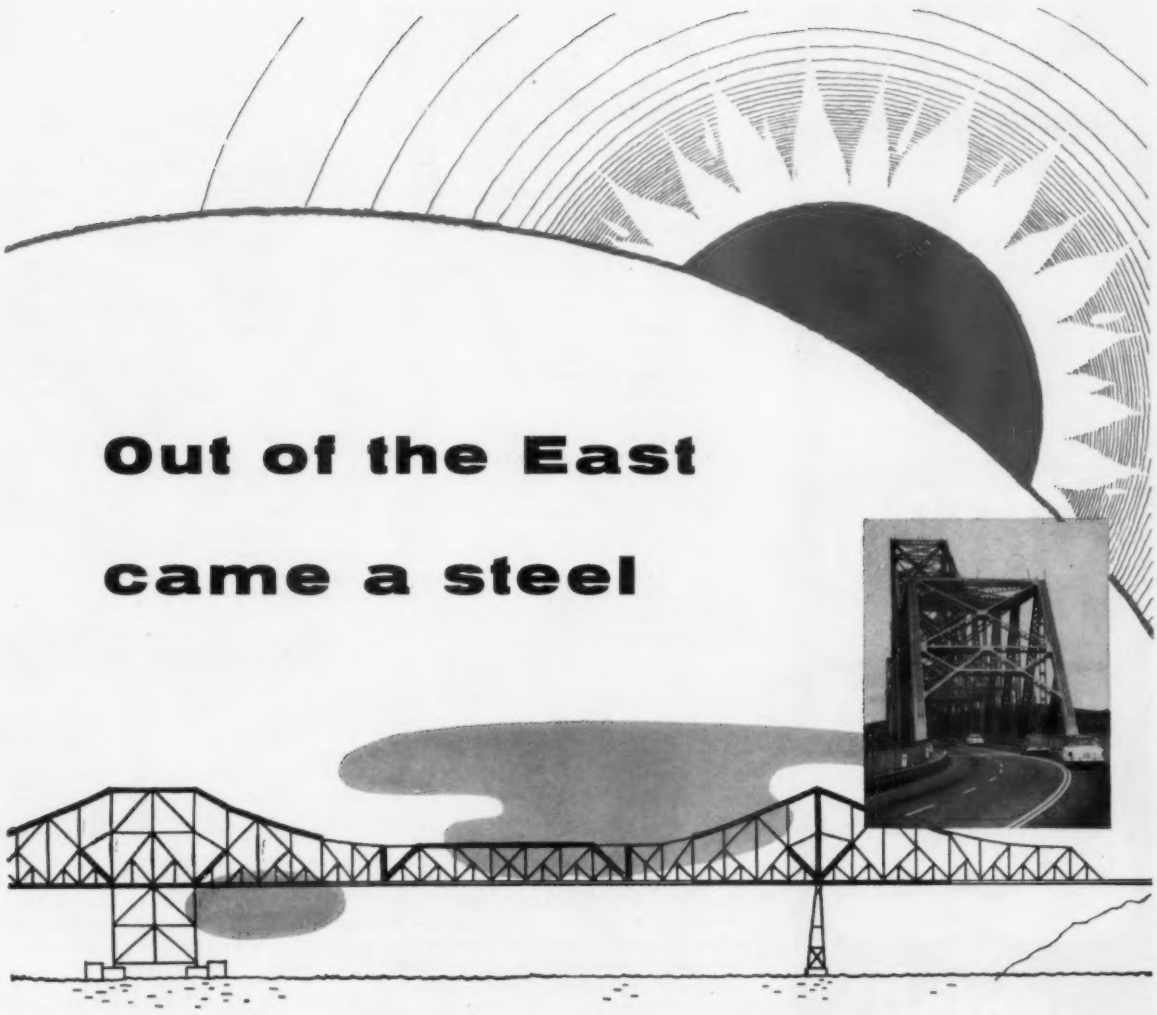

Out of the East came a steel

From Pittsburgh, Pennsylvania. From the research laboratories of United States Steel. A great new constructional alloy steel.

Bridge designers in California heard about it. They used it. And they sliced over $800,000 off the cost of a new bridge.

Now men in factories are hearing about it, and using it, and profiting by it. It is called USS "T-1" Steel. Consider its use . . .

. . . if you would build or rebuild a conveyor.

. . . if you see new lift trucks, or cranes, or hoists in your future.

. . . if a hopper needs repaired, a machine foundation needs more strength, a roof truss needs to be strong and easily fabricated.

These, and many more, are jobs that USS "T-1" Steel can do. Frequently it is the only steel that will do—because it is the only steel with very high yield strength (90,000 psi minimum) *plus* extraordinary toughness even at sub-zero temperatures *plus* good creep rupture strength *plus* ready weldability. You get them all in one steel—USS "T-1" Steel.

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UNITED STATES STEEL

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New Plant Construction

(Continued from page 150)

five miles west of Sudbury. Preliminary engineering and clearing work is already under way and new mill is scheduled to go into operation about mid-1958. Mill will cost $12.5 million.

Syracuse, N. Y.—Carrier Corp., Carrier Building, manufacturers of air conditioning, refrigeration and industrial heating apparatus has announced a major expansion of company facilities with capital expenditures over the next three year period to exceed $30 million. Approximately $10 million will be spent at local plant for research, production and administration facilities. Approximately $6.5 million has been earmarked for the construction of new plant facility on the Pacific Coast.

Ashboro, N. C.—National Carbon Co., a Division of Union Carbide and Carbon Corp., 30 East 42nd St., New York 17, N. Y., has approved plans for expansion of local flashlight battery plant here. Expansion plans will more than double manufacturing floor space of plant at a reported cost of more than $1 million. Construction of the new unit is scheduled for spring of this year and is expected to be ready for occupancy late this year or early 1958.

Pisgah Forest, N. C.—Ecusta Paper Co., subsidiary of the Olin Mathieson Chemical Corp., plans to construct a new plant addition and installation of new paper making machinery and auxiliary equipment for increased capacity. Expansion includes a new building with 70,000 sq ft of floor space which is scheduled to be placed in production by early 1958. Cost of construction, plant and auxiliary equipment will exceed several million dollars.

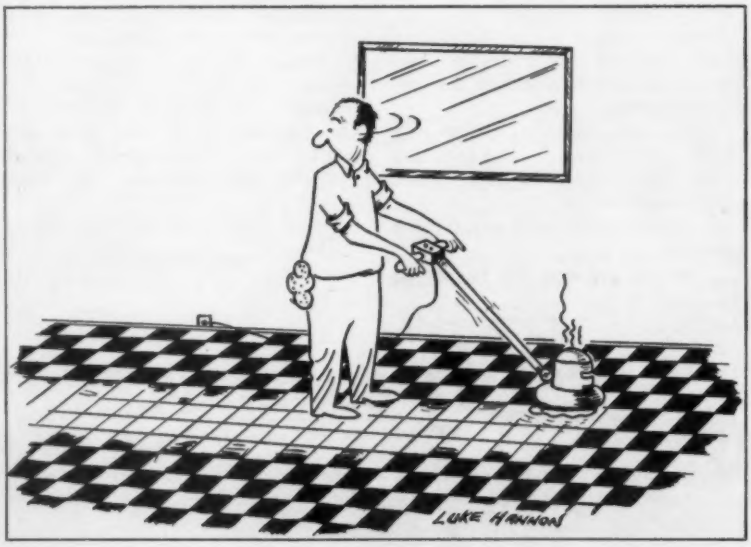
Cincinnati, O. — Cincinnati Gear Co., 4400 Wooster Pike, plans to construct a new plant for the manufacture of gears and pinions of all types on the east side of Kenwood Road. New plant will have a manufacturing area of 100,000 sq ft and is reported to cost an estimated $1.3 million. Work on the plant will get under way in the late summer of this year for completion sometime late in 1958. Hixon & Tarter, 2306 Park St., is the consulting engineering firm.

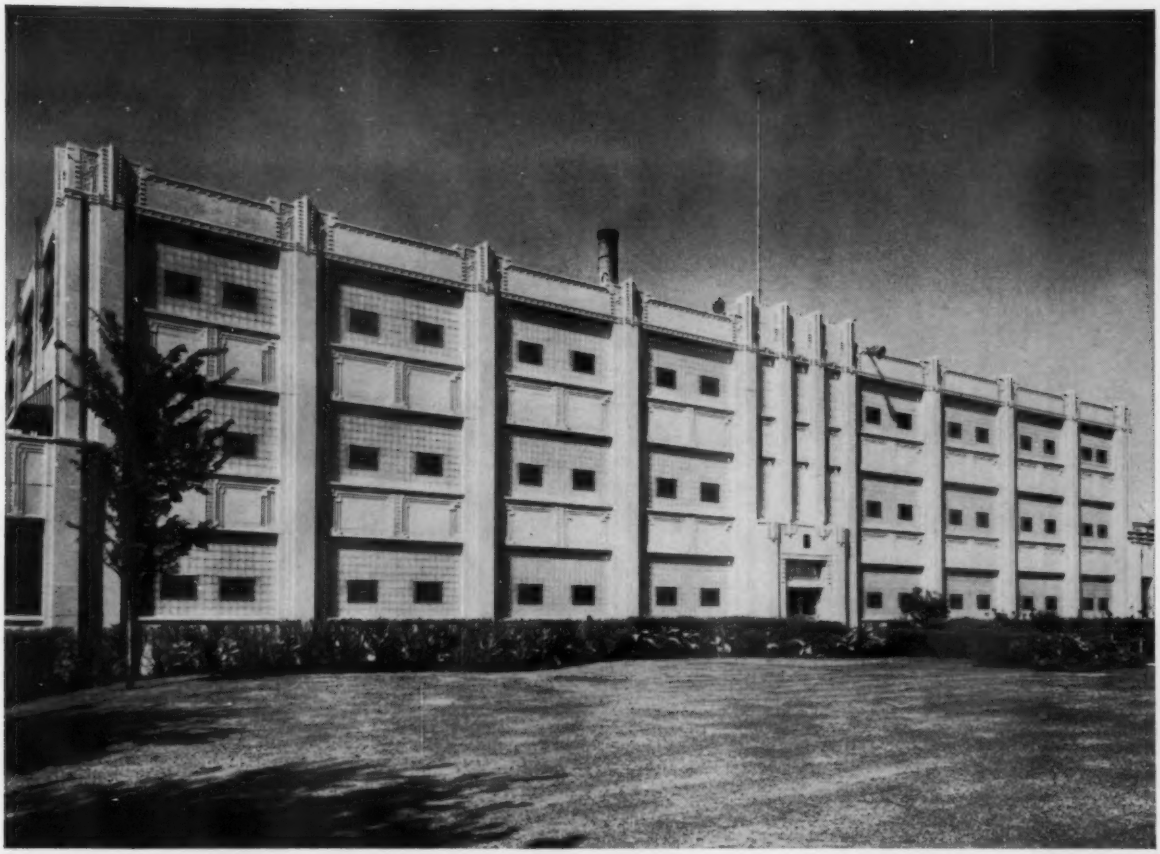
Dayton, Ohio—General Motors Corp., Frigidaire Division, General Motors Building, Detroit, Mich., has announced a multi-million dollar expansion and modernization program of its five plants located here. Program will include new buildings, additions to present structures and facilities where needed, and modernization of production equipment. Cost of expansion is reported to be between $25 and $30 million.

Niles, Ohio—Mallory-Sharon Titanium Corp., producers of titanium and titanium alloy mill products, double melted sheet, strip, plate, bars and flats, plans to construct a large-scale pilot plant for refining titanium scrap. Plant will employ new electrolytic process. Work is already under way and plant is scheduled to be in operation by the end of this year.

Van Wert, Ohio — Carborundum Co., Niagara Falls, N. Y., manufacturers of abrasive products, iron and steel deoxidizers, resistors and heating elements, plans to construct a new plant for the production of small abrasive wheels. Project is expected to be a multi-million dollar investment and is part of $30-million expansion program announced by the company earlier this year. Work is expected to get under way soon.

Pittsburgh, Pa. — United States Steel Corp., 525 William Penn Place, plans major increase in facilities of its steelmaking capacity at Pittsburgh district plants. Plans include expansion of ex-





Cracker Jack Company replaces sash with Glass Blocks...

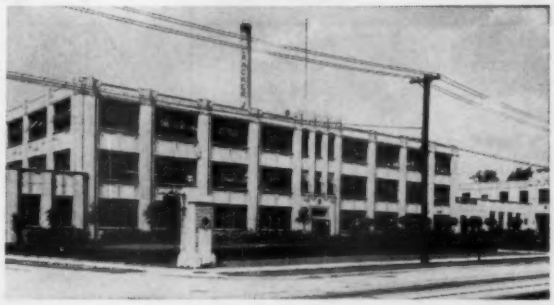
Saves annual maintenance costs of $150 per window opening

High maintenance costs for repairing windows *used to be* a problem at the Chicago plant of the Cracker Jack Company, famous confectionery producer. Two men worked almost full time on window maintenance and the annual bill came to about $150 per window opening.

This costly, recurring upkeep prompted investigation of glass block panels to replace the old sash. The modernization program won company support, and the panels were installed a few years ago. The Company reports complete freedom from maintenance since installation. Because the glass blocks are *mortared* into panels, there's nothing to rust, rot, putty, or paint. Hinge trouble is a headache of the past. Breakage is rare. And washing is just a once-or-twice-a-year job.

A string of other plant problems were solved, too. Excessive heat gain and chilly winter drafts are controlled. Glare and worker discomfort from direct sunlight is off the complaint list. Dirt and dust infiltration is no longer a problem.

If you are experiencing window problems, or are planning a new building and want to avoid the headaches, you'll find it profitable to know more about PC Glass Blocks. See us in Sweet's, or write Pittsburgh Corning Corporation, Dept. PG-37, One Gateway Center, Pittsburgh 22, Pennsylvania. In Canada: 57 Bloor Street West, Toronto, Ontario.



Here's how Cracker Jack Company's plant looked before they modernized their window areas with PC Glass Blocks. The window modernization job (upper photo) was installed by the Expert Building Maintenance & Repair Co., Chicago.

PC Glass Blocks

PITTSBURGH PC CORNING ®

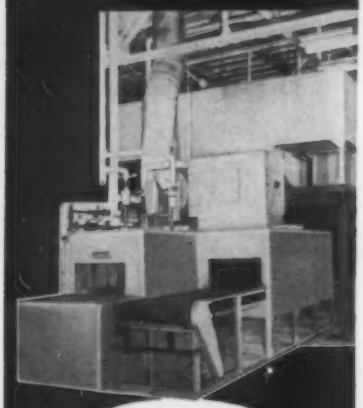
Also manufacturers of FOAMGLAS® insulation

For more facts circle 658 on Reply Card

NEEDS:

new design for crucial

metal cleaning and treating



SELECTION:

Cincinnati

You can't afford to take chances on over 2,345 sq. ft. of metal cleaning equipment. That's why Briggs & Stratton Corp., the world's largest manufacturer of 4-cycle, single cylinder, gasoline engines insisted on CINCINNATI. Ingenious use of suspended, platform-mounted and U-shaped units with transfer conveyors fits all 4 machines into just 765 sq. ft., reduces manpower and maintenance.

You can rely on CINCINNATI experts. Write today for details.

Cincinnati

CLEANING and FINISHING MACHINERY COMPANY

2023 Hageman St., Cincinnati 41, Ohio

For more facts circle 659 on Reply Card

isting open hearth and electric furnace capacity and installation of finishing equipment which will provide 450,000 tons of plate, structural steel, forgings and other steel products.

Scottdale, Pa. — Pittsburgh Screw & Bolt Corp., 2719 Preble Ave., Pittsburgh, Pa., has authorized construction of a new one-story 600,000-sq ft steel and masonry manufacturing plant on local site. Company has awarded contract for the designing and construction of the plant to the Austin Co., 16112 Euclid Ave., Cleveland, O. Preliminary work is already under way and plant is scheduled to be in operation by late 1958. Plant will represent an investment in excess of $2 million.

Baytown, Texas—Humble Oil & Refining Co., 1216 Main St., Houston, Tex., plans to construct a large ethylene recovery plant at local refinery. Construction cost of the new plant will be in excess of $5 million.

Pampa, Texas — Celanese Corp. of America, 180 Madison Ave., New York, N. Y., plans to construct a new plant for the production of acrylate esters. New facilities in Pampa represent latest step in Celanese chemical expansion program which also includes completion of new plasticizer and functional fluid plant in Point Pleasant, W. Va., and construction of new polyol production unit in Bishop, Tex.

Alexandria, Va. — Atlantic Research Corp., 321 Montgomery St., plans to construct a modern office and research laboratory on a 40-acre site, facing Shirley Highway. A one-story structure with a floor area of 60,000 sq ft will be erected on the site. Planning and construction of the new facili-

ties will be supervised by the company engineer. Cost of new facility reported to be $1 million.

Everett, Wash.—Standard Oil Co. of California has announced plans for construction of a refinery with a capacity of between 60,000 and 100,000 bbl per day, on local site. This is part of a $350-million dollar expansion program announced by the company for 1957.

Seattle, Wash. — Bethlehem Pacific Coast Steel Corp., 20th & Illinois Streets, San Francisco, Calif., has authorized a major expansion program to cost in excess of $25 million to increase steel-making capacity of local plant. Work is expected to get under way at once and is scheduled for completion by late 1960.

Get the Answers!

To your machinery mounting problems

If you work with —

MACHINE TOOLS

PUNCH PRESSES

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PRECISION GRINDERS

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MEASURING INSTRUMENTS

Korfund's complete line of products give you the right answer the first time to your installation, vibration and noise problems. Write for Bulletin 41 which gives full details.

THE KORFUND COMPANY, INC.

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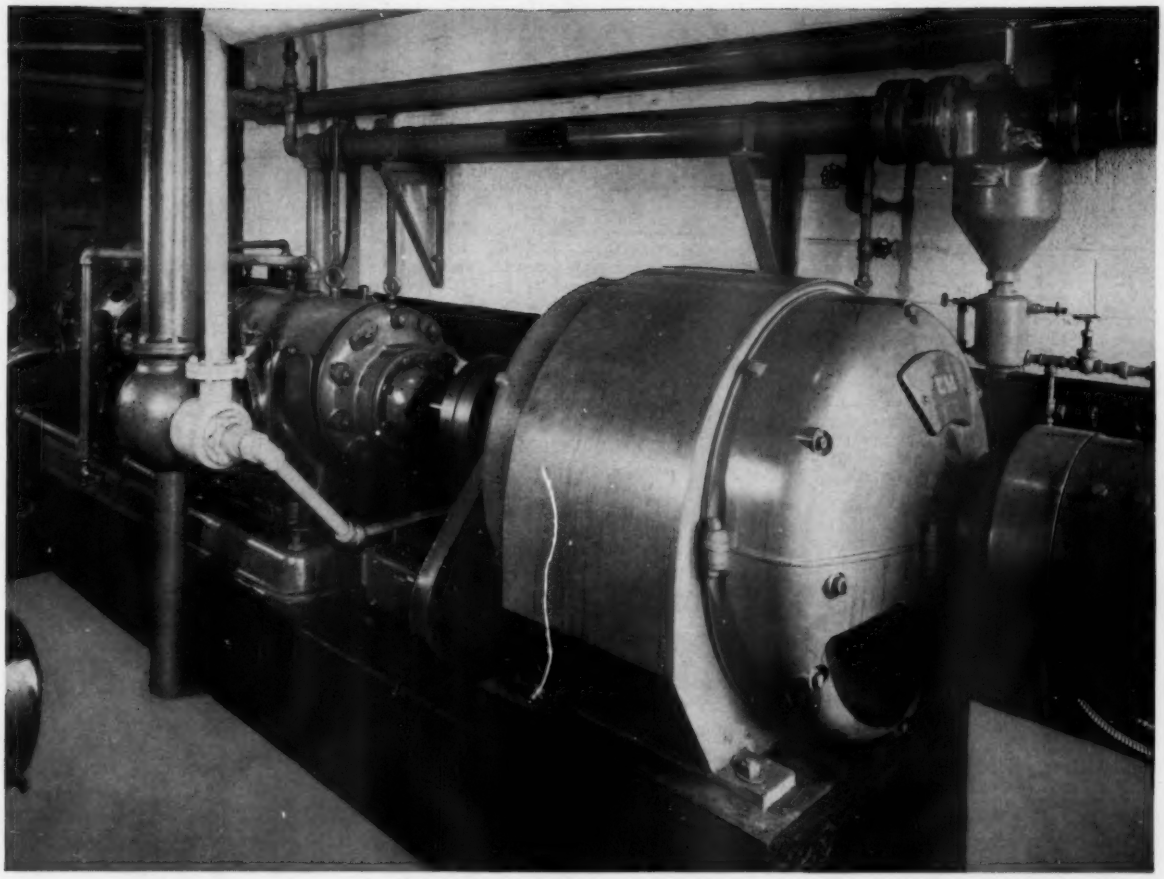
For more facts circle 660 on Reply Card



THEY'VE ORDERED FULLER ROTARIES AGAIN AND AGAIN . . .

The proof is the record. Reading Tube Corporation bought its first Fuller Two-Stage Rotary Compressor in 1944—a C50-50H. To meet expanding pneumatic power requirements for increased production, they added a C100-100H Rotary in 1946. Again, the only and obvious choice was Fuller. In 1953, Reading Tube installed its third Fuller Rotary—a C175-175H, and reports continued satisfactory and economical operation, with a bare minimum of maintenance on all three.

Reading Tube Corp. uses Fuller compressors exclusively for such variety of needs as supplying air power in their casting shop, mill, draw benches, in testing and packing, as well as for hand accessories such as grinding, polishing, drilling, etc.

Check these advantages when your plant needs reliable air power . . . . they've made Fuller the choice, time and time again.

- . . . full capacity for life of the machine
- . . . smooth air flow
- . . . sustained performance for top capacities up to 3300 c.f.m. and pressures to 125 pounds
- . . . compactness and ease of installation, requires minimum space and light foundation
- . . . vibrationless due to absence of reciprocating parts.

To get all the facts, write today for Bulletin C-5A.

C-310
3894

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138 Bridge St., Catasauqua, Pa.
SUBSIDIARY OF GENERAL AMERICAN TRANSPORTATION CORPORATION
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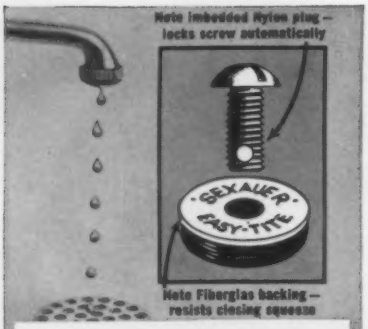
Fuller

PIONEERS OF HIGH-EFFICIENCY VANE TYPE ROTARY COMPRESSORS SINCE 1930

For more facts circle 661 on Reply Card



Why Faucets Leak

—9 out of 10 washers are fastened with —TOO LONG or SHORT screws. The screws —QUICKLY LOOSEN, thus loose washers —are destroyed thru grind and squeeze —of opening and closing faucets.

34 years of research uncovers new solution

—Now, NEW (Patented) 'Sexauer' SELF- —LOCK Monel screws, with an imbedded —expanding NYLON PLUG, lock at the re- —quired depth AUTOMATICALLY—hold —washers FIRMLY!

—Made of rustproof, non-corroding —MONEL, heads don't twist off or screw —slots distort. They are easy to remove —when necessary, can be used over and —over.

—Used with NEW 'Sexauer' EASY-TITE —faucet washers, this combination out- —lasts past faucet repairs "6 to 1"! —EASY-TITES are made of super-tough, —pliable du Pont compound (neither rub- —ber nor fiber) and reinforced, like a —tire, with a vulcanized layer of Fiber- —glas, they resist distortion and splitting —from shut-off grind and squeeze.

The hidden costs of faucet leaks!

Faucet leaks are costly! As authenticated by Hackensack, N. J. Water Co. and American Gas Association, STOPPING just ONE PIN-HOLE SIZE (1/32") LEAK can reduce water waste 8,000 gal. quarterly. If a HOT WATER FAUCET LEAK, water and fuel savings JUMP to over $7.58 QUARTERLY—plus additional savings on MATERIALS—LABOR—and *costly* FIXTURE REPLACEMENTS!

NEW SELF-LOCK screws and EASY-TITE faucet washers are just TWO of the "SEXAUER" line of over 3000 TRIPLE-WEAR plumbing repair parts and Pat'd. precision tools.

A "SEXAUER" Technician in your vicinity will make our NEW 126 page Catalog "H" available. He will gladly consult with you regarding a SURVEY of your plumbing fixtures to determine correct repair parts required and establish reasonable stock levels that avoid both overstocking and shortages—thus providing for efficient stock arrangement and control—all without obligation. WRITE TODAY.

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WORLD'S LEADING SPECIALISTS IN PLUMBING AND HEATING REPAIR PARTS

For more facts circle 662 on Reply Card

NEW BOOKS

for the plant engineer

Timber Technology

TIMBER DESIGN AND CONSTRUCTION HANDBOOK. Size 9¼ by 6⅜ in.; 622 pp including index; illustrated cloth bound. Published by F. W. Dodge Corporation, 119 West 40th St., New York 18, N. Y. Price $12.75.

THIS COMPREHENSIVE DESIGN reference and practical field handbook includes contributions from a group of 25 people comprised of engineers and specialists. The book contains essential information for the construction and development of wood structures of quality and economy.

There are three main sections in the book. Fundamental structures and characteristics of wood are covered in the first section. This coverage includes types, grades and ways of preservation.

Preliminary considerations, general design procedure, design details, fabrication and erection are explored and analyzed in the second section.

The third section gives the user a concise tabular reference to fit combinations of grade, span and loading. It includes design and engineering specifications and data in simplified form.

Some of the chapters in the book are as follows: post and beam construction; roof trusses; arches; special framing; and design standards.

Power Distribution

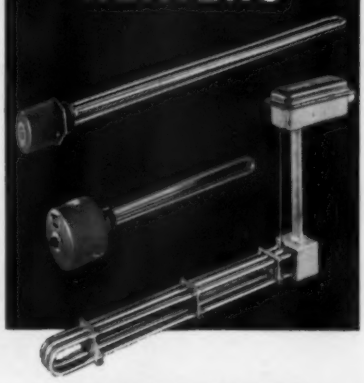
ELECTRIC POWER DISTRIBUTION FOR INDUSTRIAL PLANTS. Size 11 by 8⅜ in.; illustrated; paper bound. Published by American Institute of Electrical Engineers, 33 West 39th St., New York 18, N. Y. Price $3.50 (discount to members).

A SUBCOMMITTEE of the committee on Industrial Power Systems, being in effect a pool of experience and knowledge, took three years for the compilation of information for this publication. This is the second edition of material first published in 1945 on this general subject.

It includes information on system planning covering such items as selection of circuit arrangements, system voltages, substation size and lighting distribution methods. In the portion on system protection, among the subjects treated are the following: types and characteristics of protective relays, coordination of protective devices, periodic testing of equipment, and fuses.

The chapter on power factor deals

For clean, accurate, dependable heat
CONVERT TO
CHROMALOX ELECTRIC IMMERSION HEATERS



CHECK THESE 5 BIG FEATURES

- **Portable, screw-plug, flanged types; full range of sizes and ratings**
- **"Packaged" units—heating element and thermostat in one**
- **Copper, steel, alloy or lead sheath**
- **Explosion and moisture-resistant terminal boxes available**
- **Most sizes ready NOW for immediate shipment**

For these applications:

Heating water, oils, Dowtherm, Prestone, tars, greases • Plating, cleaning and pickling solutions • Heating tanks, drums, process kettles • Melting greases, asphalt, other viscous fluids • Super-heating steam, compressed air • Melting lead, solder, babbitt and stereotype metal.

FREE CATALOG

Write today for Catalog 50. Full details including prices for Chromalox Electric Immersion Heaters and other units that provide the electrical answer to many more heating problems.

C-2102A

Edwin L. Wiegand Company
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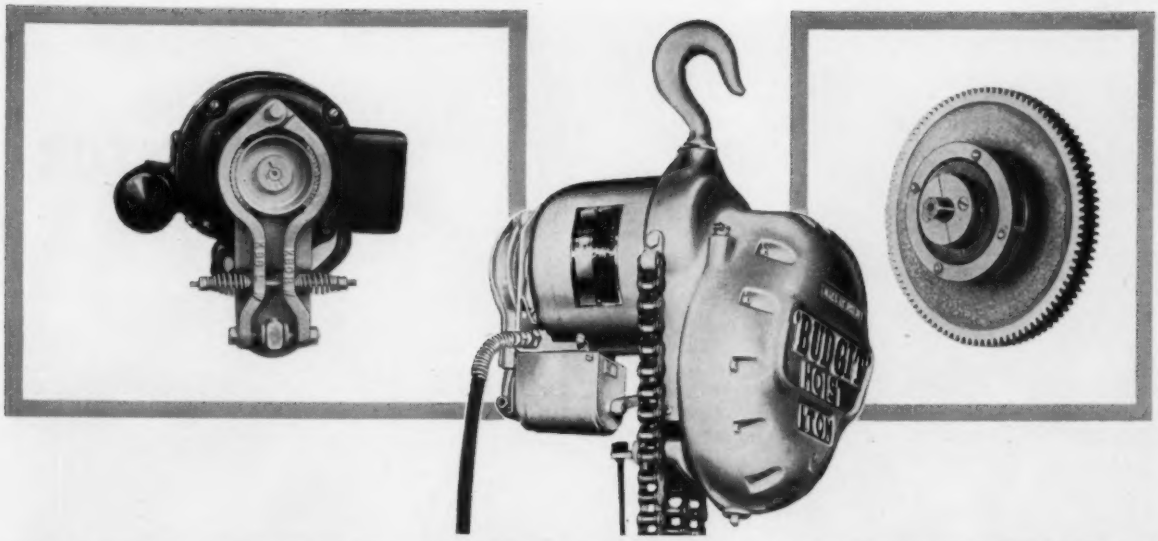
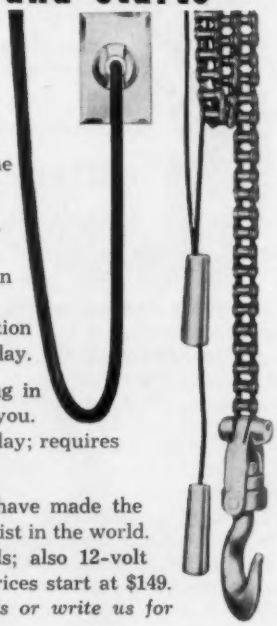
CHROMALOX
PRODUCT OF GENERAL ELECTRIC

For more facts circle 663 on Reply Card



POWERFUL TWO-BRAKE HOIST

gives you greater SAFETY plus "hairline" stops and starts



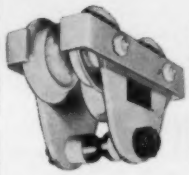
The 'Budgit' Electrical Hoist has a motor brake and a load brake. They operate simultaneously, automatically. Each alone is strong enough to hold the full load safely. Braking action is so quick, load-spotting time is greatly reduced.

The 'Budgit' is easy to operate with one hand. The other hand is always free to guide the load. You get fast Hoisting. A 500-lb. load can be lifted 1 foot in less than 2 seconds. Less hoisting time means less idle time for production machines. More units can be processed per day.

Installation is no problem. Just hang up, plug in and the 'Budgit' is ready to work and save for you. It uses only a few cents' worth of electricity a day; requires very little maintenance.

Ruggedness, efficiency, safety and economy have made the 'Budgit' Electric Hoist the most widely used hoist in the world. Capacities: ⅛ to 2 tons. AC and DC models; also 12-volt battery-operated models for use on trucks. Prices start at $149. *Ask your "Shaw-Box" Distributor for details or write us for Bulletin 402.*

FOR GREATER CONVENIENCE, USEFULNESS



I-Beam Trolley adds travel-ability to any hoist. Bearing-equipped wheels roll smoothly. Fit various size I-beams. Capacities ¼-ton up. Priced from $19.50.

Chain Container collects 'Budgit' tail chain neatly—keeps it up out of the way. Holds up to 25 feet of chain. No drilling, no machining to install. Priced from $17.00.

'Budgit' Cord Reel. Keeps conductor cord taut. Cord may be led off in any direction. Useful on any hoist or other motor device up to 1 HP. 25 and 50 foot cords. Priced from $74.50.

57A-9

MAXWELL MANNING M&M & MOORE INC. TRADE MARK

'Budgit'® **ELECTRIC HOISTS**

MANNING, MAXWELL & MOORE, INC.

SHAW-BOX CRANE & HOIST DIVISION

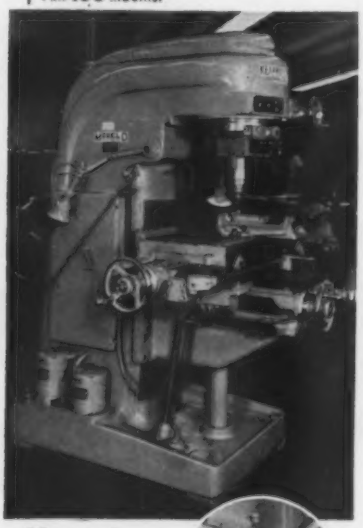
362 West Broadway • Muskegon, Michigan

Builders of "SHAW-BOX" and 'LOAD LIFTER' Cranes, 'BUDGIT' and 'LOAD LIFTER' Hoists and other lifting specialties. Other Divisions produce 'ASHCROFT' Gauges, 'HANCOCK' Valves, 'CONSOLIDATED' Safety and Relief Valves, 'AMERICAN' and 'AMERICAN-MICROSEN' Industrial Instruments, and Aircraft Products.

In Canada: Manning, Maxwell & Moore of Canada, Ltd., Avenue Road, Galt, Ontario.

For more facts circle 664 on Reply Card

Kearney & Trecker milling machine installed at low cost on firm, high density AIR-LOC mounts.

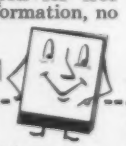


Here's the VINYL vibration dampening mount Air-Loc® 4·17·4

- ✓ *Completely resists* oil, water, etc.
- ✓ *Reduces* transmitted noise & vibration as much as 85%.
- ✓ *Shims easily* for quick leveling.
- ✓ *Eliminates* use of bolts and cement. Vinyl serrations hold machines to floors.
- ✓ *Reusable* when you move machines.

You just sit the machine on AIR-LOC mounts and push the "Start" button. Return coupon for free samples and more information, no obligation.

Free booklet tells all



AIR-LOC DIVISION
Clark, Cutler, McDermott Company
Franklin, Massachusetts

Please send samples and AIR-LOC booklet to:

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COMPANY.....
ADDRESS.....
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For more facts circle 665 on Reply Card

with fundamentals and improvement. Motor starting and control equipment, switchboards and panelboards, and transformers are facets of electric power distribution that have been given attention in a chapter on power equipment.

Plug-in, feeder and trolley busways, and protective coverings are among the topics treated in a chapter on conductors and terminators.

On Deafness

INDUSTRIAL DEAFNESS by J. Sataloff, M.D., D.Sc. Size 9¼ by 6¼ in.; 333 pp including index; illustrated; cloth bound. Published by the Blakistan Div., McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 36, N.Y. Price $8.00.

AUTHORED BY A PHYSICIAN with years of research and clinical work on the subject, this guidebook begins with fundamental considerations. These include the physics of sound, ear functions, causes of deafness, and effects of deafness on the human being. Material is presented simply enough to permit users with no training in acoustics, anatomy or medicine to benefit from studying it.

There are directions in the book on choosing and using ear protectors and the setting of risk criteria. Measurement of noise and hearing loss are other items treated in the publication. In the appendix there is a reprint of information on the meaning of a hearing conservation program. This is followed by reference material on visual aids which includes sources for procuring them.

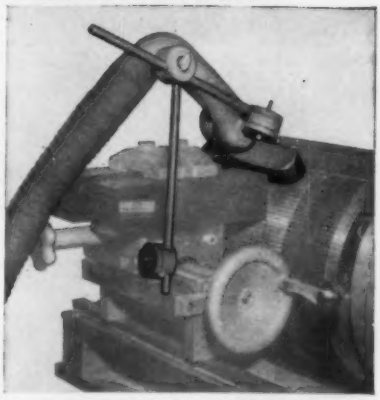
Industrial Technology

MATERIALS AND PROCESSES IN MANUFACTURING by E. Paul DeGarmo. Size 9½ by 6⅜ in.; 755 pp including index; illustrated; cloth bound. Published by the MacMillan Co., 60 Fifth Avenue, New York 11, N. Y. Price $8.50.

FROM TIME TO TIME, it might be well for a plant engineer to review and expand his knowledge of materials and processes which directly and

an IDEAL idea...

DUSTLESS COMMUTATOR GRINDING!



Vacuum attachment picks up metal and stone dust as it is made . . . keeps it out of machine

- **Compact and simple, it does NOT interfere with work in progress.**
- **Fits all IDEAL industrial vacuum cleaner hoses; mounts on grinder or on motor or generator frame.**
- **Cuts clean-up time, prevents bearing trouble and hard-to-locate short circuits.**

Model No. 24-073 is for small commutators; mounts on Ideal's "Midget" Model Grinder or motor or generator frame. Stationary nozzle covers entire commutator.

Model No. 24-074 mounts on Ideal's "Perfect" or "Ideal" Model Grinder, traverses large commutators with the grinder.

Write for more information on these handy attachments. When writing, also ask for IDEAL's informative series of articles on "Commutator and Slip Ring Maintenance."

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3879-C Park Avenue, Sycamore, Illinois

☐ Send more data on vacuum attachment described in this ad.

☐ Add my name to your mailing list for FREE "Commutator & Slip Ring Maintenance" articles.

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For more facts circle 666 on Reply Card

Engineers from Blaw-Knox and Arthur D. Little, Inc., make intermediate check on data as operator (on left) watches signals on control console of electronic computor

Power Piping Division develops

new "6 x 6" Flexibility Matrix Method —cuts calculation time from months to a day

Present day operating requirements demand power piping systems that can handle extremely high temperatures and pressures—often up to 4500 psi and 1100° F. Under these critical conditions pipe may expand as much as ten inches in a hundred feet of pipe.

To be sure of adequate flexibility of the piping system, the terrific stresses set up by this expansion must be accurately computed before fabrication. And these computations are often so complex that skilled stress analysts have had to take two to three months, sometimes more, to complete them.

Now, by using the Blaw-Knox "6 x 6" Flexibility Matrix Method, computation time is cut to one day.

Developed in an 18-month joint research project of the Blaw-Knox Power Piping Division and the Arthur D. Little, Incorporated, Cambridge, Mass., research consultants, this new method of computation takes advantage of the high speed and accuracy of electronic computers.

Results are: Completely automatic computation with no limitations on the complexity of the systems. Full accuracy—as any inconsistencies in the input data are detected by the machine and all results are carried to six significant figures. Tremendous saving in time. Highly profitable saving in costs.

Originally developed for calculating stress analysis on systems fabricated or designed by Blaw-Knox Power Piping Division, this new method of computation is now available to consulting engineers, companies and individuals responsible for the design of power piping systems.

Bring your piping stress problems to our Power Piping Division for a discussion with our experienced piping engineers.

BLAW-KNOX COMPANY
Power Piping and Sprinkler Division
Pittsburgh 33, Pennsylvania

Complete facilities for prefabrication and erection of piping systems—complete line of functional spring hangers, assemblies and vibration eliminators—complete engineering and installation of Automatic Sprinkler Systems

For more facts circle 667 on Reply Card

ACCURATE TEMPERATURE CONTROL of Hydraulic Liquids PREVENTS LOSSES

● This NIAGARA AERO HEAT EXCHANGER cools the liquid for a large hydraulic press, preventing heat damage to the pump stuffing boxes. Using outdoor air as the evaporative cooling medium, it removes the heat at the rate of input (1,875,000 BTU/hr.) with no cooling water consumption except a negligible amount evaporated.

Similar Niagara machines cool water, oils, solutions, lubricants and coolants for many mechanical, electrical and chemical processes. In a closed system, your coolant is never contaminated. The system is simple and easy to keep up; the equipment has a long, useful life.

Write for Bulletin 120
for a complete description

NIAGARA BLOWER COMPANY
Dept. PE, 405 Lexington Ave.
NEW YORK 17, N. Y.
District Engineers in Principal Cities of United States and Canada

For more facts circle 668 on Reply Card

indirectly affect his industrial activities and responsibilities. This college engineering textbook can be quite helpful not only as a refresher but as a familiarization medium.

Within the introductory part pertaining to materials, the text deals with production and properties of common engineering metals, equilibrium diagrams, alloy steels and irons, nonferrous alloys and plastics.

The portion on machining processes covers many operations including: shaping and planing, drilling and reaming, boring, milling, broaching, thread cutting and forming, and gear manufacture.

Welding and allied processes also have a share of the text. Attention has been given to: forge. gas, thermit and resistance welding. Brazing, soldering and cutting are topics covered in this section.

In the part on related subjects there is information on decorative and protective surface treatments, mass production tools and techniques, and the planning of manufacturing operations.

Questions and Answers for Professional Engineer's License

PROFESSIONAL ENGINEER'S EXAMINATION QUESTIONS AND ANSWERS by William S. LaLonde, Jr. Size 5½ by 8¼ in.; 462 pp; illustrated; cloth bound. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y. Price $6.50.

THIS BOOK was prepared to help the newly graduated engineer and the older practicing engineer prepare for a professional engineer's examination.

About 80 per cent of the problems appearing in this book were taken directly from sample question sheets or past professional engineer examinations as given by the many state boards.

A review of the types of questions, covering all major phases of professional engineering examinations, will show you in which areas you can improve your knowledge.

The book is divided into three parts. Part One contains general information on qualifications, eligibility, definitions of a professional engineer, etc., as well as a list of addresses of the registration boards.

Part Two covers questions from past examinations regarding the basic fundamentals of chemistry, electricity, hydraulics, etc., and then specific questions on chemical engineering, civil engineering, mechanical engineering, etc.

Part Three contains the answers to the questions on basic fundamentals and the specific engineering categories mentioned in Part Two.

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WATER TREATMENT, THAT IS

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For more facts circle 669 on Reply Card

compare LINK-BELT with any other geared flexible coupling

Here are the features that build acceptance for the compact LINK-BELT design

New LINK-BELT design saves SPACE and COST

1 LARGE GEAR DIAMETER with respect to external dimensions reduces gear tooth pressure.

2 ACCURATE GEAR TEETH with controlled clearance to permit misalignment with minimum backlash.

3 RIGID ASSEMBLY of two-piece housing with special hardened steel cap screws and lock washers.

4 POSITIVE RETENTION OF LUBRICANT—and exclusion of dust and water—with special compound O-ring seals.

5 GREATER BORE CAPACITY lets you use a smaller coupling where shaft size dictates selection.

6 SIMPLE ASSEMBLY requires only an Allen wrench.

Ask your nearest Link-Belt office for Folder 2375. Or mail the handy coupon today.

LINK-BELT COMPANY
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Chicago 1, Ill.

Please send me a copy of Folder 2375, covering Geared Flexible Couplings.

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City..... Zone... State.....

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For more facts circle 670 on Reply Card

...No Equal for Quick Pipe Threading

...these handy efficient RIDGID Drop-Head Dies

A die head for each size, ⅛" to 2"—they snap into ratchet ring from either side, can't fall out—reverse for close threads. Tough malleable and steel heads, famous RIDGID long-wear dies—conduit or special dies available. OOR and OR, ⅛" to 1"; 111R and 11R, ⅛" to 1¼"; 12R, ⅛" to 2". Bargains in fast easy threading—at your Supply House.

The Ridge Tool Company • Elyria, Ohio, U. S. A.

RIDGID
Work-Saver Pipe Tools

For more facts circle 671 on Reply Card

Electronically controlled roller expanders lock the tubes in position in tube sheets during fabrication of all Pfaudler heat exchangers

How to save money on Heat Exchangers

Would you like to skip the extra expense of buying custom built heat exchangers?

Pfaudler has taken design features previously associated only with custom built units and *standardized* them.

For a given heat transfer area, select the most applicable combination of length and diameter. Nozzles can be of any size, located in any position and either threaded or flanged. This flexible standards program applies to fixed tube sheet, single or multipass, tube and/or shell side stainless steel units in diameters up to 30". Over all cost is reduced and delivery speeded up.

Pfaudler also offers heat exchangers for severe corrosive services, combining alloys with low cost glassed steel parts, wherever practical, to keep costs to a minimum.

Any one of these designs can save you money, give you better results. Regardless of your heat exchanger needs, it will be to your advantage to check with us before buying. Let us send you our complete Heat Exchanger Manual.

THE PFAUDLER CO.
ROCHESTER 3, N.Y.
Specialists in corrosioneering

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BULLETINS

(Begins on page 21)

159 **Pressure Filters**—Publication *6322* gives details on large volume, horizontal pressure filters for use in industrial plants, institutions, others. Describes operation, control, filter bed materials, design features, available accessories. Also shown are drawings of various arrangements of two-, three-, and four-header units. Cochrane Corp.

160 **Feed Water Heaters**—Bulletin 117-A, 12 pp, describes open coil tray-pipe feed water heaters designed to heat water to a higher temperature in less space. Covers both deaerating and non-deaerating types, with a capacity range of 3,000 to 300,000 lb per hr. Includes facts on what a feed-water heater does, how heaters are rated, and function of a vent condenser. Stickle Steam Specialties Co.

TOOLS, WELDING AND MACHINE SHOP EQUIPMENT

162 **Pneumatic, Hand Chisels**—This 16-pp catalog standardizes pneumatic and hand chisels by point style, body size, and shank type. Twelve point styles are listed for each body size and collar type, with dimensional detail shown by line illustrations. Charts list parts numbers for each size and style, and a chemical and physical analysis of the shock tool steel alloy is included. Bedford Tool and Forge Co.

163 **Air-Motor Tools**—Bulletin 61 concerns manufacturer's new line of air-motor grinders and drills. Various models are pictured in action along with application suggestions and specifications. Versatility, power and other features of tools are stressed. Airetool Mfg. Co.

164 **Tube Expander Control**—Bulletin 56-1 describes company's Model C Torq-Air-Matic, an air-powered boiler-tube expander drive and control. Advantages of precise tube rolling are discussed and features of the new device enumerated. Thomas C. Wilson, Inc.

165 **Machine Tool Switches**—Bulletin 956, 8 pp, on heavy duty limit switches features 21 contact arrangements. Describes housing, contact arrangements, wiring diagrams, ampere ratings, operating data and electrical characteristics of each of the nine standard models. Gives dimensional data and drawings, together with specifications on three types of covers including a plastic watertight cover and six types of mounting plates. R. B. Denison Mfg. Co.

166 **Metal Sawing Handbook**—This 36-pp handbook of metal sawing covers selection and use of hand and power hack saw blades and band saw blades. Selection of correct blade for any job is simplified by charts. Recommended cutting speeds, feeds and techniques are also tabulated. Common metal cutting problems and preferred solutions are a feature. All items in this handy, pocket-size handbook are indexed for quick reference. W. O. Barnes Co., Inc.

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167 **Metal Cutting Method**—Development and applications of Aircomatic cutting, a new method for straight line and shape cutting of non-ferrous metals, are described in detail in 24-pp Form ADE 880. Employing company's standard Aircomatic welding equipment for manual and machine cutting, this method is reported particularly applicable for high-speed cutting and shaping of plates and parts to be joined by gas-shielded arc welding. Air Reduction Sales Co., Air Reduction Co., Inc.

168 **Tap Drivers**—Three types of "Safe-Torque" tap drivers, designed to increase tap life production, are described in Bulletin 20-50. Tension and compression, standard, and quick-change drivers, all using the safety features are covered. Scully-Jones and Co.

169 **For Notching Tube, Pipe**—This 24-pp catalog describes production and economy advantages of company's machine for notching tube and pipe to make joints for welding. Text is illustrated with large photos showing complete operation, and specifications are included. With the catalog, comes a sample of finished product. Wallace Supplies Mfg. Co.

170 **Carbide End Mills**—Revised and expanded, 12-pp Catalog 601, on cutting tools, devotes greater space to solid carbide end mills and provides such data as diameters, flute radii, shank diameters, and over-all lengths, on 11 types of mills. Information is also given on company's H.S.S. and carbide rotary cutters, counter sinks and special tools. A cutting speed conversion chart is included. M. A. Ford Mfg. Co.

171 **Sheet Metal Machines**—Booklet 201, 32 pp, catalogs briefly company's line of manually operated machines and tools for light sheet metal work. Pocket-size, this reference guide contains summarized data and descriptions of all important models. For complete information on any particular item, references are made to specific bulletins, obtainable by mailing reply card. Niagara Machine & Tool Works.

172 **Tape Control System**—The principle and mode of operation of the Digimatic tape control system for machine tools are described in this 12-pp booklet. Describes planning desk, high-speed special purpose computer, and machine control unit which comprise the system. Techniques for preparing and checking data, entering data into planning desk, and operating machine control unit are fully detailed. Electronic Control Systems, Inc.

METALS

173 **Aluminized Steel**—Bulletin P.O. 3056 describes the properties and characteristics of Aluminized steel Type I, a special-purpose steel reported to have resistance to combinations of heat and corrosion; high heat reflectivity; and the surface qualities of aluminum with the strength of steel. Armco Steel Corp.

174 **Cast Alloy Designations**—Latest revision of the list of standard designations and chemical composition ranges for heat and corrosion resistant cast alloys is offered in this designation chart. Noteworthy is addition of two new cast alloys of the 18-8 variety, with low carbon. Alloy Casting Institute.

OTHER EQUIPMENT

175 **All About Glass**—Manufacturing methods, applications, and the history of glass are featured in this colorful 66-pp catalog. The publication deals with such topics as what glass is, how it is made, and used. It is profusely illustrated with charts, drawings, and 130 photos showing typical products and applications. Properties of selected glasses are also shown on a chart. Corning Glass Works.

177 **Hot Spray Heaters**—Lower finishing cost per unit, one coat application, faster spraying, and other advantages of company's hot spray heaters are detailed in illustrated Bulletin PM-914. Both non-circulating models for continuous duty, and circulating models for continuous and intermittent duty are described and pictured. The Spee-Flo Co.

178 **Glass-Protected Stacks**—Several installations of Permaglas smokestacks are featured in 8-pp Bulletin SS-202. They show these stacks in use in breweries, smelters, manufacturing plants. How these stacks are protected inside and outside against corrosion is told in detail, and their long-run economy is stressed. Process Equipment Div., A. O. Smith Corp.

179 **Fluid Power Equipment**—Industrial fluid power equipment is presented in condensed Bulletin 400. Hydreco gear and Dual-Vane hydraulic pumps, control valves, and cylinders are described and performance information detailed. Photos, drawings and cutaway views illustrating component features are included. Kalamazoo Div., The New York Air Brake Co.

180 **Standard Storage Tanks**—The broad scope of services to which company's standard storage tanks are put is covered in this 20-pp catalog. Such qualities as versatility and economy are stressed, and typical installations are pictured. Engineering standards are also included. Graver Tank & Mfg. Co., Inc.

181 **Lamination System**—Technical Bulletin *22* describes hand lay-up system of epoxy resin laminations, as used in making glass-laminated epoxy-resin impressions for metal working and model and pattern reproducing. Covers preparation of models and other procedures. Provides suggestions for handling, mixing, weighing, and care of tools and brushes. Smooth-On Mfg. Co.

182 **On Screw Threads**—Form *2239*, a 16-pp booklet on screw threads, points out that two types of thread gages—a functional type for checking the high limit of tolerance and a pure pitch diameter type for checking low limit of tolerance—must be used to provide a true indication of thread fit. Describes basic principles of measuring high and low limits of pitch diameter tolerance, gives tips on gaging techniques to insure accurate reading, and covers reference data including Class 3A pitch diameter tolerances, best wire sizes for 3-wire thread gaging. Standard Pressed Steel Co.

Among this Month's New Literature of Merit . . .

183 **Arc Welding Machines**—Catalog 1340, 44 pp, contains complete information on arc welding machines and accessories for metal fabrication, construction and repair. Selenium rectifier and d-c motor generator arc welders for industrial welding, a-c and d-c engine driven arc welders for construction and maintenance, a-c transformer arc welders are among machines illustrated and described. Specifications for each machine, from ampere ratings to outside dimensions, are included. Air Reduction Sales Co., Div. Air Reduction Co., Inc.

184 **Guide to Push Buttons**—How to select right push button for every application is told in 32-pp Catalog 5606 A, covering oil tight and general purpose push buttons, pilot lights and accessories. Provides description of components and complete units, dimensions, cam action and schematic diagrams. Photos illustrate all types and styles. Furnas Electric Co.

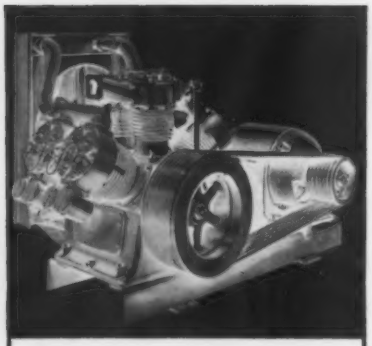
185 **Industrial Insulations**—Full specifications for company's line of spun mineral wool industrial insulation products are presented in this 20-pp catalog. Lists standard sizes, thicknesses, and thermal conductivities for more than 20 types of heat and cold insulations for equipment and piping, and includes temperature-thickness recommendations for each. In addition, it also describes typical uses and provides application instructions. Baldwin-Hill Co.

186 **Stud Welding Standards**—This pocket-size 36-pp booklet covers industry standards in arc welding studs, pins and tapped pads for stud welding. Concise and easy to read, booklet contains a complete index and reference to equipment and accessories used in stud welding applications. Each specification page lists size minimums and maximums. It details mechanical properties, chemistry, thread sizes, plating and annealing data. K S M Products, Inc.

187 **Replacement Glazing**—Twelve-pp Booklet PL-251 gives detailed information on glazing industrial and other buildings with flat panels of the acrylic plastic, Plexiglas. Written for plant engineers concerned with frequent breakage of windows or other glazing problems, this practical booklet gives properties and behavior of this sheet. Plastic Dept., Rohm & Haas Co.

188 **Portable Tools**—Industrial construction and other portable power tools for the manufacturing, construction, woodworking and metalworking industries are described in this 50-pp catalog. Tools appear in logical sequence of size and duty rating. Specification tables at bottom of each page permit easy selection of tools. Accessories for all tools are also cataloged. Skil Corp.

189 **Permanent Magnets**—This 12-pp catalog includes information on permanent magnets, thermistors and Thyrite varistors. Divided into four sections, it discusses subjects in relation to a designer's problems, points out new approaches, possibilities and applications. How magnets help miniaturize products, determining proper magnet for a particular application, how thermistors and Thyrite varistors can be harnessed are covered. General Electric Co.



Reduce compressor maintenance problems...

with Le Roi air-cooled compressors

Efficient Le Roi two-stage air compressors are lightweight, compact, easily installed anywhere in the plant.

They're air cooled, too! That means:

- *No rusted radiators*
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- *No thermostat troubles*

Replace your problem air compressor with a Le Roi — the latest engineering development in its size class. Available in 50, 75, and 100 hp sizes and displacements up to 548 cfm at 125 lbs. pressure. Tell us your air problem ... we'll gladly suggest an installation. No obligation, of course!

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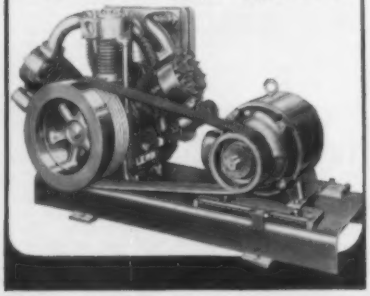

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BULLETINS

(Begins on page 21)

190 Engine Pre-Cleaner—Bulletin 110 describes the Staynew pre-cleaner for diesel and gasoline engines on construction equipment. Oil savings, easy installation and maintenance, and other advantages are discussed. Construction features of this air intake filter are illustrated, as is simplified method of cartridge removal. Dollinger Corp.

191 Colloidal Dispersions—A brief survey of current uses of 'dag' colloidal dispersions in various industries—metal working, ceramics, electronics, product engineering, lubrication, maintenance—is presented in V.1, No. 4 of the "dag disperser." Acheson Colloids Co.

192 Phenolic Products—Company's entire product line of phenolic molding materials and resins is described in illustrated Brochure CDC-322. Includes detailed technical data, special properties and product features of phenolic molding powders, rubber phenolic molding powders, phenolic laminating varnishes, and industrial, other resins. General Electric Co.

193 Dock Loading Hose—Detailed information on a dock loading hose and fittings for handling gasoline and oil is presented in two data sheets. One reviews dock loading hose and provides technical information on construction, specifications, and recommended uses. Data on fittings is provided on a separate data sheet, which describes various types of couplings, including forged aluminum nipples and flanges and steel nipples and flanges. B. F. Goodrich Industrial Products Co.

194 Compressor Lubricant—Pydraul AC, a fire- and explosion-resistant fluid developed specifically as a lubricant for air compressors is the subject of Technical Bulletin O-133. Physical properties and instructions for the conversion of compressors to its use are contained in the bulletin. Organic Chemicals Div., Monsanto Chemical Co.

195 For Plastic Welding—Three plastic compounds for joining, filling, cladding, and surfacing masonry materials are described in this illustrated brochure. Discusses properties and uses of the products, gives instructions for their use, and lists major corporations which have found applications for them. Seven jobs are illustrated. Permagile Corp. of America.

196 Mechanical Packings—Popular mechanical packings used on many applications in industrial, power and processing plants are listed in this illustrated folder. Covers shaft packings, valve stem packings, rod and plunger packings, piston packing, gasketing, also Teflon packings. Flexrock Co.

197 Closed Circuit TV—The Observer TV camera which offers effective closed circuit television at low cost is described in Form TVC-1256. Design and construction features are detailed, applications discussed. Blonder-Tongue Laboratories, Inc.

198 Refractory Castable—Bulletin R-40 describes use of Kaocrete-32, a high temperature refractory castable, in boiler ashpits. A discussion of various methods of ash removal, along with maintenance problems peculiar to each, is presented. Four typical installations are detailed. Refractories Div., The Babcock & Wilcox Co.

199 Horsepower Computer—This handy computer and booklet, "Fascination in Numbers," are designed to provide rapid and accurate solutions to a variety of mathematical problems. Computer may be applied for ordinary slide rule computations, also for any formula involving two variables, raised to any power or root, and a constant. Booklet is a miscellany on mathematics and theory of numbers, including bits of mathematical history and famous number puzzlers, with their solutions. Both are available to qualified plant engineers. Please state your job title. Graham Transmissions Inc.

200 Heavy Duty Mill—Bulletin 1-B gives the detailed features and construction of the Model HD hammer mill designed for rugged service. Various installation arrangements are outlined, illustrated with photos of typical installations. Conventional products collecting systems for use with the hammer mill are also covered. Sprout-Waldron & Co., Inc.

- moves *Inland Steel Products* into special production 4-times faster
- helps cut direct-labor costs 20% for *The Colorado Fuel & Iron Corp.*
- no lost production time in moving *Wyman-Gordon* machine shop
- cuts machine installation cost 90% for *American Type Founders*

Barry Leveling Machinery Mounts let you move machines wherever they are needed, and have them delivering full output *in minutes*—with no delays for drilling, lagging, or shimming.

"PROOF-OF-PERFORMANCE" REPORTS FREE!

These reports, giving details of results obtained from Barry Mounts in large and small plants, point the way to important savings in your plant. **WRITE NOW FOR YOUR COPIES.**

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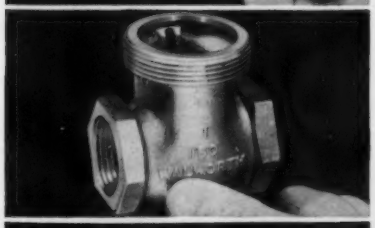
Here's what makes Walworth Bronze Valves *the* real bargain!

TYPICAL OF WALWORTH QUALITY is the union body-to-bonnet connection which stiffens the body against internal pressure; makes taking the valve apart a simple operation and reduces the chances of distortion or leakage even though the valve is repeatedly taken apart and reassembled. With this type of construction there is no possibility of the bonnet coming off the valve while the handwheel is being turned.

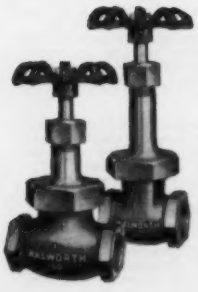


HEAVY BODY CONSTRUCTION is typical of *all* Walworth Bronze Valves. Extra-thick walls and rugged wrench hexes constitute a high safety factor and prevent distortion while the valve is being installed in the pipeline. Extra-deep pipe threads are accurately machined to eliminate leakage. Walworth Bronze Valves are also available with flanged, silver-brazed or soldered ends in certain sizes and types.

EXTRA-LARGE STEMS with extra-long, extra-deep threads prolong valve life, protect against wear and distortion and provide tight positive shutoff. The surface of the stem is machined to a glass-like finish for minimum handwheel effort and to preserve the packing which results in fewer inspections and less maintenance. The top of the stem is tapered and squared to hold the handwheel securely.

TO REDUCE WIRE DRAWING to a minimum, certain types of bronze globe valves have stainless-steel plug-type seats and discs heat-treated to a nominal hardness of 500 Brinell, adding years to valve life even in severe services. These valves can be tightly closed on sand, grit or pipe scale without damage. Seats and discs are machined simultaneously, assuring perfect mating.

There is a Walworth Bronze Gate, Globe, Angle or Check Valve for every service. Walworth is continually developing new valve types and materials, including plastics, to keep pace with the growing variety and severity of services in modern industry. For full information, see your Walworth Distributor or write: *Walworth, 60 East 42nd Street, New York 17, N.Y.*



WALWORTH

Bronze Valves and Fittings

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DATA FILE of literature for the plant engineer's library

STANDARD CATALOGS, bulletins and handbooks are listed to help plant engineers maintain a permanent data file. To get these free catalogs, circle item numbers of those wanted on postage-free cards provided for you on pages 257-258.

TOOLS, WELDING AND MACHINE SHOP EQUIPMENT

301 Data for the Shop—"Fluids and Facts for Metal Working" is a pocket-size booklet of about 44 pp. A section on metal working fluids covers their function and selection, preparation and use of soluble oils and paste compounds, and prevention of dermatitis. A section on metal working facts gives conversion tables, steel numbering systems, machinability ratings of metals, drill grinding charts, twist drill sizes and other data. Standard Oil Co. (Ind.)

302 Portable Electric Tools—This standard catalog, Form 10, 24 pp, features portable electric tools, including electric drills, benchdrill stands, hole saws, buffing and polishing kits, sanders, polishers, grinders, hammers, saw blades, vacuum cleaners and others. Photos included. The Black & Decker Mfg. Co.

303 Pipe Tool Ordering Guide — Catalog 2-51, 8 pp, covers company's line of threaders, cutters, vises, dies, tongs and wrenches; gives prices. Armstrong Bros. Tool Co.

304 Industrial Tools—Hand tools and shop tools for production lines, maintenance work and service departments are featured in 108-pp Industrial Catalog 54-1. Loaded with pictures and tool facts, the book describes in detail the complete line of over 4,000 tools—including chests and cabs, wrenches and sockets, screwdrivers, pliers, pulling equipment, tool assortments and many others. Snap-On Tools Corp.

305 Pipe Tools—Ordering and application information on Ridgid pipe tools is provided in 16-pp illustrated Catalog 7596R-5. Wrenches, cutters, threaders, reamers, vises, and others are pictured and described, also power drives, pipe and bolt threading machines, oilers. Capacity, weight and price data included. The Ridge Tool Co.

306 On Spot Welding—"Spot Welding from One Side—With a Portable Gun," 12 pp, describes an inert-gas-shielded tungsten-arc spot welding process. Over 30 tables, weld cross-section and application photos, drawings and graphs are included. Sections of text cover when to consider spot welding from one side, how the equipment operates, standards and test procedures, factors affecting weld. Air Reduction Sales Co., Div., Air Reduction Co., Inc.

LIGHTING, COMMUNICATION

307 Architectural Floodlighting — Eight-pp Bulletin GEA-6437 illustrates various methods of floodlighting industrial plants, public and commercial buildings and others. Provides information on general purpose heavy-duty floodlights. Also contains tips on floodlighting of vertical surfaces and discusses four "musts" of an efficient economical floodlighting installation. A table of recommended foot-candle levels for exteriors provided. General Electric Co.

308 Fluorescent Lighting—This 24-pp fluorescent lighting guide book is a reference digest on fluorescent products. Gives advantages of this type of lighting; summarizes various lamps and parts, including starter sockets, lampholders. Includes reference chart for lamp performance when interchanged with typical ballasts. Sylvania Electric Products Inc.

309 Guides to Luminaires — Pocket-size, 28-pp Bulletin B-5799-BB covers fluorescent luminaires for industrial and other use. Summarizes salient features of each type of luminaire as it discusses electrical characteristics, maintenance and mounting data, details of construction, dimensions, and recommendations for application. Also contains a pictorial guide to floodlights and incandescent luminaires for industrial and other use. A 4-pp tabulation of buying data is provided. Westinghouse Electric Corp.

310 Lamps for Industry—Eight-pp Bulletin 66 presents manufacturer's line of lamps for industrial service, indoors and outdoors. These include mercury vapor lamps, weatherproof floodlights, high bay reflector lamps, spotlights, infra-red lamps, spatterproof lamps, and others. Illustrated with photos, curves indicating candlepower, brief text covers features and applications of each type. Radiant Lamp Corp.

311 Industrial Lighting—Designed to be inserted in company's lighting catalog, these two data sheets describe application, construction, installations and wiring details of two types of lighting units. Section 30, Sheet 20 features all-porcelain industrial units and Section 30 Sheet 18 covers vapor-tight units. Engineering data included. Day-Brite Lighting, Inc.

312 Plant Lighting Planning Guide—This 32-pp handbook of industrial lighting presents economics of a plant lighting program in terms of lower production costs, reduced working time, less fatigue and eyestrain, less spoilage, fewer accidents, better morale. Explains six major steps in initiating, developing and carrying out a lighting program; tells how to select equipment and stresses importance of maintenance. Includes table of recommended levels of illumination for industrial interiors. Benjamin Electric Mfg. Co.

313 Industrial Lighting Units—The 36-pp RLM Standard Specifications for industrial lighting units contains important revisions in specifications on both incandescent and fluorescent industrial lighting units, as well as new lighting data of special value to specifiers. Most important of the changes and additions are new coefficient of utilization tables for eight incandescent and fluorescent lighting units. Calculations are based on latest Zonal Method of computing coefficients of utilization and illumination. RLM Standards Institute, Inc.

314 Signal Equipment — Tips on how to select suitable signals for any specific operations are offered in one of a series of bulletins—Nos. 100-125 — bound in this 40-pp catalog. Other bulletins describe horns, bells, warning lights, other signal equipment. Specifications, photos, wiring diagrams, dimensions, audibility rating charts, electrical characteristics and other data included. Federal Sign & Signal Corp.

ELECTRICAL

315 Motor Buying Tips—Bulletins GEC-1026A and GEC 1027A, each 11 pp, give buying information on a selected group of this manufacturer's motors. Included are application data, ratings and prices for fractional horsepower motors, integral-horsepower polyphase and single phase induction motors, motors and control for part winding starting, gearmotors and resilient-base integral-horsepower induction motors. General Electric Co.

316 Polyphase Motors — Bulletin 103 provides design features of company's Loadstar polyphase motors conforming to new NEMA standards and also gives tabulated information on the changeover. Open drip-proof and totally enclosed fan cooled motors are covered. Photos show construction details. Leland Electric Co.

317 Motors—General specifications for company's open drip-proof motors and splashproof motors, and enclosed motors are contained in 8-pp Bulletin 800. Includes data on construction features, electrical specifications, dimensions, mounting dimensions, as well as dimensional diagrams. Brook Motor Corp.

318 Commutator Slip Ring Maintenance—This practical little 40-pp handbook gives procedures and methods for commutator and slip ring maintenance. Generously illustrated with photos and sketches, booklet contains sections devoted to common troubles and their corrections; brushes; general maintenance; and company's products for maintenance of commutators and slip rings. Defines commutator terminology. Ideal Industries, Inc.

319 FHP Manual Starters—Bulletin 224 is a folder giving the features and ratings of a line of fractional horsepower manual starters. Lists applications for them. Square D Co.

320 Motor Controls—In the 86-pp Controlog are cataloged a variety of motor controls including starters, control centers, contactors, relays, switches, and accessories. Fully illustrated with photos and dimensional drawings, gives applications and descriptive information on each class, and includes prices and ordering data. General engineering data included. The Clark Controller Co.

321 Motor Starters—Booklet 1062, 16 pp, describes motor starters having short circuit protection for 2200- to 5000-v systems. Illustrates starters using company's 50,000 kva interrupting capacity type HS contactor; also starters which will safely interrupt the circuit from a bus of unlimited capacity. Indoor and outdoor installations are pictured. The Electric Controller & Mfg. Co.

322 What You Should Know About Circuit Breakers—Sixteen-pp Manual 101 explains operating principles of basic circuit breaker designs and provides engineering data on factors of application. Includes simplified diagrams of three basic types. Illustrates with colored charts and diagrams, explains temperature factors, inrush current effects, tripping and reset time. Heinemann Electric Co.

323 Enclosed Switches—Catalog 83, 28 pp, describes in detail enclosed switches for industrial applications. Included are general switches designed for use on either a-c or d-c applications, sealed switches, heavy-duty limit switches, hand operated switches, and maintained-contact switches, all of which are available in a variety of actuator designs, contact arrangements and electrical ratings. Photos, dimensional drawings, circuit diagrams, electrical data are included. Micro Switch, Div., Minneapolis-Honeywell Regulator Co.

324 Low Voltage Switchgear—Twelve-pp Bulletin 6004B presents low voltage switchgear of the metal-enclosed, drawout type for indoor and outdoor installation using Types K and LG air circuit breakers. Design and construction details are explained and illustrated and emphasis is placed on safety advantages afforded by test position with door closed. General specifications and standard frame arrangements given. I-T-E Circuit Breaker Co.

325 Panel Components—Bulletin EE-120 is a 54-pp panel builders handbook of electrical components, containing specifications, diagrams, dimensions, photos and price lists of company's motor control. Profusely illustrated with photos, dimensional and wiring diagrams, bulletin covers manual starters, relays and contactors, magnetic starters in non-reversing, reversing, and multi-speed types, and a group of accessories which include thermal overload relays, oil tight pushbutton units, limit switches, timing devices, solenoids, electrical interlocks, and solenoid-operated brakes. Cutler-Hammer, Inc.

326 High-Capacity Fuses—Form HCS, 6 pp, describes fuses of unlimited interrupting capacity on voltages to 600, designed to afford protection for loads of 600 to 5000 amp. Includes test data, charts on opening time, current limiting effect. Bussman Mfg. Co.

327 Aluminum Conduit Fittings—To fulfill the need for electrical equipment made of materials which resist corrosive attack of many chemicals destructive to ferrous or standard aluminum equipment, Bulletin 2681 presents a broad selection of Condulets and related equipment utilizing copper-free aluminum alloy in their construction. It includes Condulets, lighting fixtures, plugs and receptacles and others for both hazardous and non-hazardous locations. Book provides a pictorial-descriptive index plus full catalog listings, prices. Crouse-Hinds Co.

328 Electrical Wires, Cable—Bulletin 1105, Section 1, 16 pp, features a cable selection chart and complete engineering information on company's line of electrical wire and cable. Advantages of the products are detailed, a table of insulations furnished, and design and construction features illustrated. The Okonite Co.

329 Trolley Busway Systems—Three bulletins offer real help on electrical installations involving cranes and hoists, assembly and pro-

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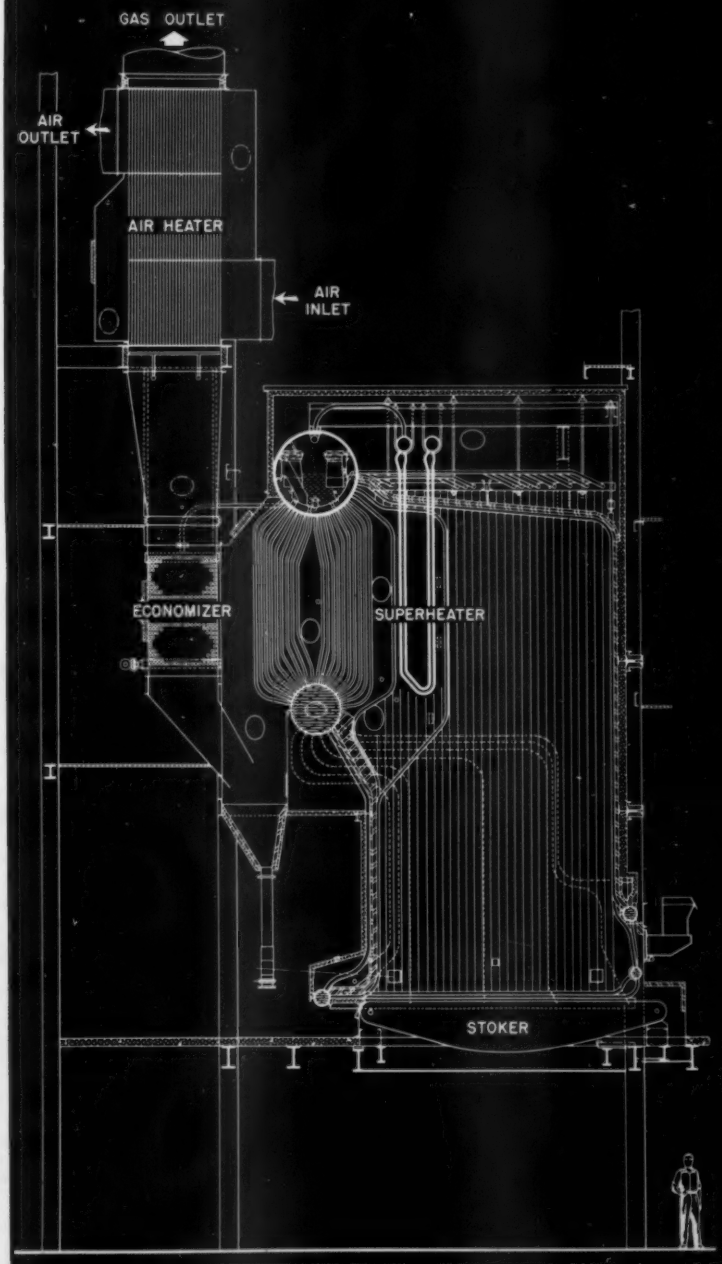

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DATA FILE

(Begins on page 262)

duction lines, moving test lines and other moving electrical equipment. Bulletin 35 (28 pp) covers 225-500 amp systems; Bulletin 50 (44 pp) 100 amp systems; Bulletin 45 (40 pp) 60 amp systems. Each includes special sections on installation planning and procedure, methods of mounting and descriptions and illustrations of equipment. Feedrail Corp.

330 **Asbestos Insulation**—"Specifications for Asbestos Varnished Cambric N.E.C. Type AVA Lighting Wire and Power Cables," 8 pp, establishes performance tests for asbestos insulation applied as a felted wall in combination with varnished cambric tapes for wires and cables with 600 and 1000 v ratings. Also measures plus values of the construction over and above industry standards. Standards for test characteristics, such as minimum permissible breakdown after initial dielectric test are covered. Rockbestos Products Corp.

331 **Cathodic Protection Cable**—Two kinds of cathodic protection cables are described in this informative bulletin. Special advantages of each are listed, and applications and specifications are given. General Cable Corp.

332 **Switch Wiring Diagrams**—Bulletin 709 is a 36-pp booklet of typical wiring diagrams for across-the-line starting switches. Indexed and arranged for easy use, this booklet serves as a guide to some of the many ways in which this company's manual and magnetic across-the-line starters can be applied. Some of the diagrams incorporate more than one useful feature. Includes key to electrical symbols used. Allen-Bradley Co.

333 **Flexible Cords**—This well-illustrated 24-pp booklet includes all new Underwriters classifications for flexible cords manufactured by this company. Featuring data on Dynaprene and rubber jacketed cords as well as braid covered types, also gives tips on how to select proper cord. Whitney Blake Co.

334 **Cable Troughs**—This 12-pp catalog offers a simple solution to any design problem of change of direction or elevation with a complete set of standard fittings, horizontal elbows, inside and outside vertical elbows, ties, crosses, covers, and many special fastening devices to save time and labor. Contains full instructions for installation, load charts, accessory items. The Globe Co.

335 **Battery Manual**—Battery selection techniques are emphasized in 20-pp Bulletin 210, a revised edition of this manufacturer's manual on storage batteries for stand-by power, emergency lighting and switchgear applications. A discussion of charging equipment and simplified battery maintenance procedures is included. Storage battery installation procedures are described and illustrated by photos. Exide Industrial Div., The Electric Storage Battery Co.

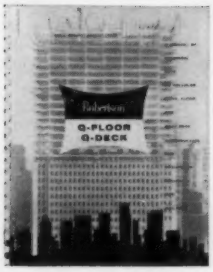
336 **Handbook on Storage Batteries**—This 64-pp booklet of instructions and technical data is the sixth edition of this company's battery service manual. Provides a brief treatise on the theory of the lead-acid battery. Gives detailed instruction on the care and operation of batteries, on maintenance and repairs, and on standard and special parts. Booklet is of special value to plant engineers concerned with storage batteries for cycle service in industrial trucks and materials handling equipment. Gould-National Batteries, Inc.

337 **Motive Power Batteries**—This 48-pp general service manual on lead-acid batteries for all types of motive power application is a practical guide to industrial cycle service, including industrial truck, air conditioning, and others. Includes photos, charts, tables, methods of repair, maintenance and theory of operation, instructions covering repairs with regular or special tools, simplified testing methods, including safety practices, acid handling precautions, and charging methods. C. & D. Batteries, Inc.

VIBRATION CONTROL

338 **Vinyl Machinery Mount**—Advantages of company's vinyl machinery mount are outlined in this illustrated brochure. Installations in a representative plant are shown. Clark, Cutler, McDermott Co.

Write- for these free books from H. H. Robertson Company's technical library



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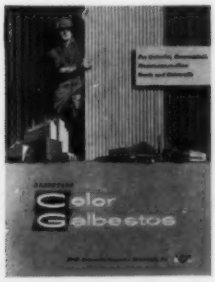
New Composite Q-Floor—Q-Deck Catalog:

Catalog contains technical data on all phases of cellular steel floor and roof deck construction. Structural details and specifications are more complete than ever before.



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Color Galbestos:

Complete details and specifications on this maintenance-free roofing and siding now available in colors. Catalog shows the four new colors in addition to the standard black and maroon.

3.
Ventilation Engineering Booklet:

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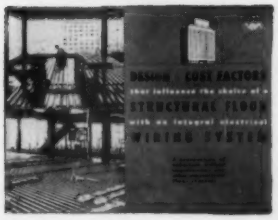
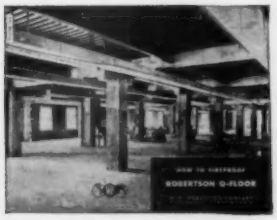


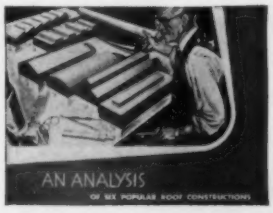
4.
Design and Cost Factors

This book compares Q-Floor with other types. Based upon a typical multi-story building, the study is replete with charts and cost analyses of all structural components.



5.
How to Fireproof Q-Floor and Structural Steel

This is a description of fireproofing methods when Q-Floor is used with structural steel framing. It contains detailed drawings, typical code requirements and fire resistive ratings.



6.
An Analysis of Industrial Roof Construction

All the better-known roof types (flat, monitor, bow-string, double-pitch, high-low bay, saw tooth) are compared on the basis of weight of structural steel, volume, roofing, sash area, flashing, ventilation and daylighting.

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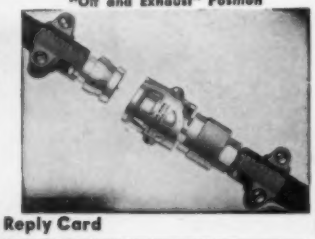

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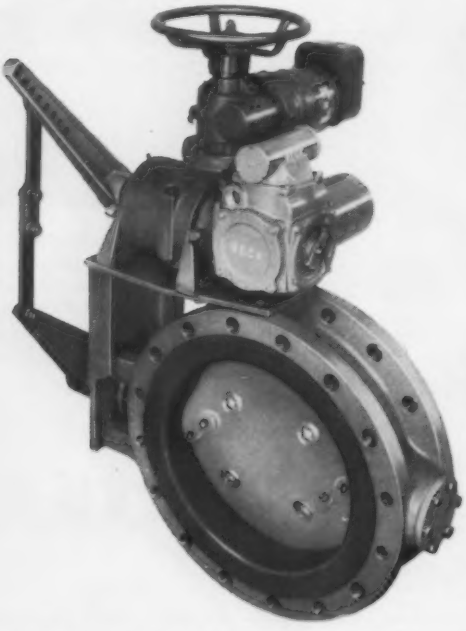

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DATA FILE

(Begins on page 262)

339 **Vibration Control Specifications**—Bulletin F2B shows how to write vibration control specifications for all types of air conditioning and related equipment regardless of the operating conditions. Contains a definitive treatment of factors involved in selection of various isolation media, with particular attention to the influence of existing job conditions. A selector chart included. The Korfund Co., Inc.

MECHANICAL POWER TRANSMISSION

340 **Roller Chains, Sprockets**—Catalog 754, 84 pp, describes, illustrates a line of roller chain stock sprockets, including minimum bore sprockets for reboring, also finished bore and Taper-lock bushed sprockets which are ready to use. Tables show speed ratios for sprocket combinations, standard keyways and setscrews. Includes chain selection and application data, installation and lubrication recommendations, chain length calculations, dimensions and price lists for single and multiple strand roller chains. Diamond Chain Co.

341 **Sprockets and Chain**—Bulletin A-624 24 pp, is compiled to provide plant engineers with all data required for selecting and ordering roller chain and sprockets. Devotes a page to Taper-Lock sprockets for each size of chain from 40 to 100, giving sectional drawing, dimensions, number of teeth, maximum stock bore available, weights, prices and other data. Another page covers Taper-Lock bushings; and full information is given on riveted and cotter-type roller chains. Dodge Mfg. Corp.

343 **Helical Gear Drives**—A new line of in-line helical gear drives is described in 16-pp Book 2651. Load classes for over 250 applications, overhung load ratings and dimension tables, insructions for proper selection and cut-away views of both double and triple reduction drives are given. Link-Belt Co.

344 **Fluid Drive**—Eight-pp Bulletin 9819 describes and illustrates adjustable speed Gyrol fluid drives, 1- through 25-hp, giving advantages and applications. Components and operation are covered in detail and selection tables are provided for direct connected and V-belt types. American Blower Corp.

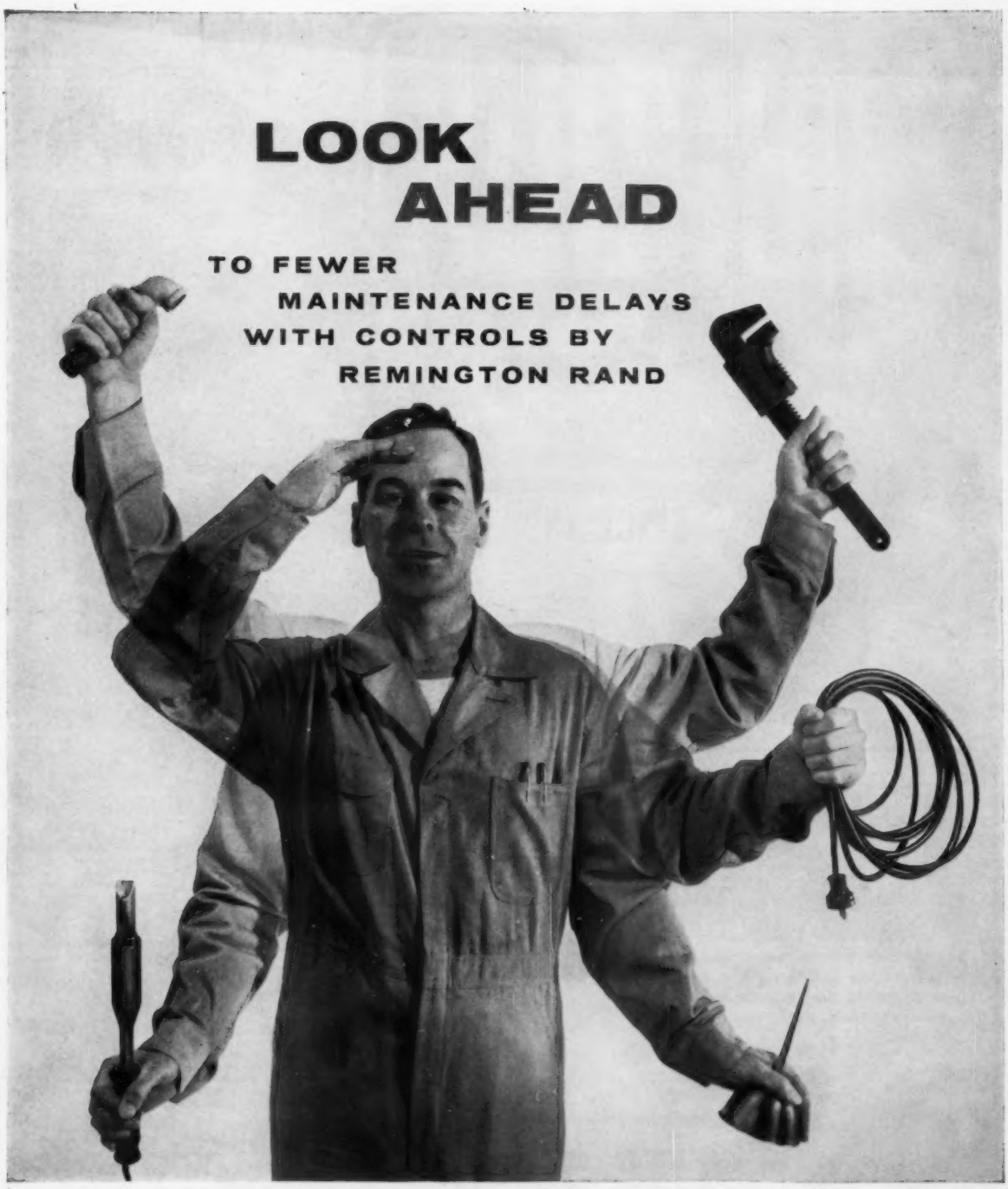
345 **Adjustable V-Belt** — This 8-pp catalog covers company's Veelos TD and TE V-belt designed to reduce installation and operation costs on big drives. Studs, cup-washers and T-screws of the belt are illustrated, and installation and operation characteristics explained. Booklet includes directions on how to measure, to couple and uncouple, and to install the belts. Manheim Mfg. & Belting Co.

346 **Flexible Couplings**—Condensed Engineering Catalog 51-A contains excellent data on the choice and use of company's flexible metal couplings for power transmission. Tells advantages of these couplings and discusses design principles. Double-flexing and floating shaft types, light duty couplings and types for special applications are described and pictured in detail. Thomas Flexible Coupling Co.

347 **Fluid Couplings**—Bulletin 144-D, 14-pp, presents complete installation and performance data on fluid couplings. Illustrated with diagrams and drawings, bulletin shows ease of applying company's fluid couplings on any type industrial equipment, powered by any type electric motor or internal combustion engine from 3/4 to 850 hp. Describes standard models providing standard input, output combinations, and standard models in packaged units. Installation hook-ups are given, along with typical applications. Twin Disc Clutch Co.

LUBRICATION

348 **Lubricants—Specification, Classification**—Vital information on selection of lubricants is presented in 10-pp Vol. 41, No. 4 of "Lubrication." Covers such items as performance specifications, initial suitability of lubricants, quality of lubricant, effect of lubricant on production, effect on maintenance, effect on power, effect on cost, and features a look to the future. The Texas Co.



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DATA FILE

(Begins on page 262)

349 For Better Lubrication—Advantages of company's lubricants which are specially compounded for lubrication of reduction gear drives are outlined in pocket-sized folder. Features which assure smooth, trouble-free gear drive performance and lower maintenance costs are listed. Gulf Oil Corp.

350 Detergent Oils—How to clean sludge out of hydraulic and lubrication system without shutting down machines is told in Technical Bulletin 44. Also tells how continued use of these highly detergent oils keeps equipment as clean as new. Sun Oil Co.

CONSTRUCTION

351 Glass for Industrial Use—How glass is used and how to choose the proper type for the application are covered in 12-pp Catalog 56-1. Discusses glass according to function; light diffusion and glare reduction; decoration; protection; and heat absorption. Photos showing various finishes and typical installations are provided, along with performance data, selection and installation tips, light transmission ratings. Mississippi Glass Co.

352 Window Modernization—How to modernize old windows with company's glass blocks is told in 8-pp Bulletin GB-104. Selection data is included, along with photos of typical installations. Pittsburgh Corning Corp.

353 Fiberglass Reinforced Panels—This file of bulletins covers fiberglass-reinforced panels for a wider range of industrial glazing jobs. Data is provided on shatterproof panes, Fire-Snuf panels, and metal-reinforced security panels. Strength test reports and physical data as well as information on light transmission qualities are included. Resolite Corp.

354 How to Glaze with Plexiglas—Sixteen-pp Booklet PL-23 gives detailed information on glazing industrial and other buildings with flat panels of the acrylic plastic Plexiglas. Written for plant engineers concerned with frequent breakage of windows or other glazing problems. Gives properties and behavior of this sheet. Plastic Dept., Rohm & Haas Co.

355 Panel Wall Construction—The advantages of company's M-Type Q-Panel walls are outlined in 12-pp Bulletin Q-35-55. Includes installation photos, diagrams, specifications, as well as drawings, pointing out structural details. H. H. Robertson Co.

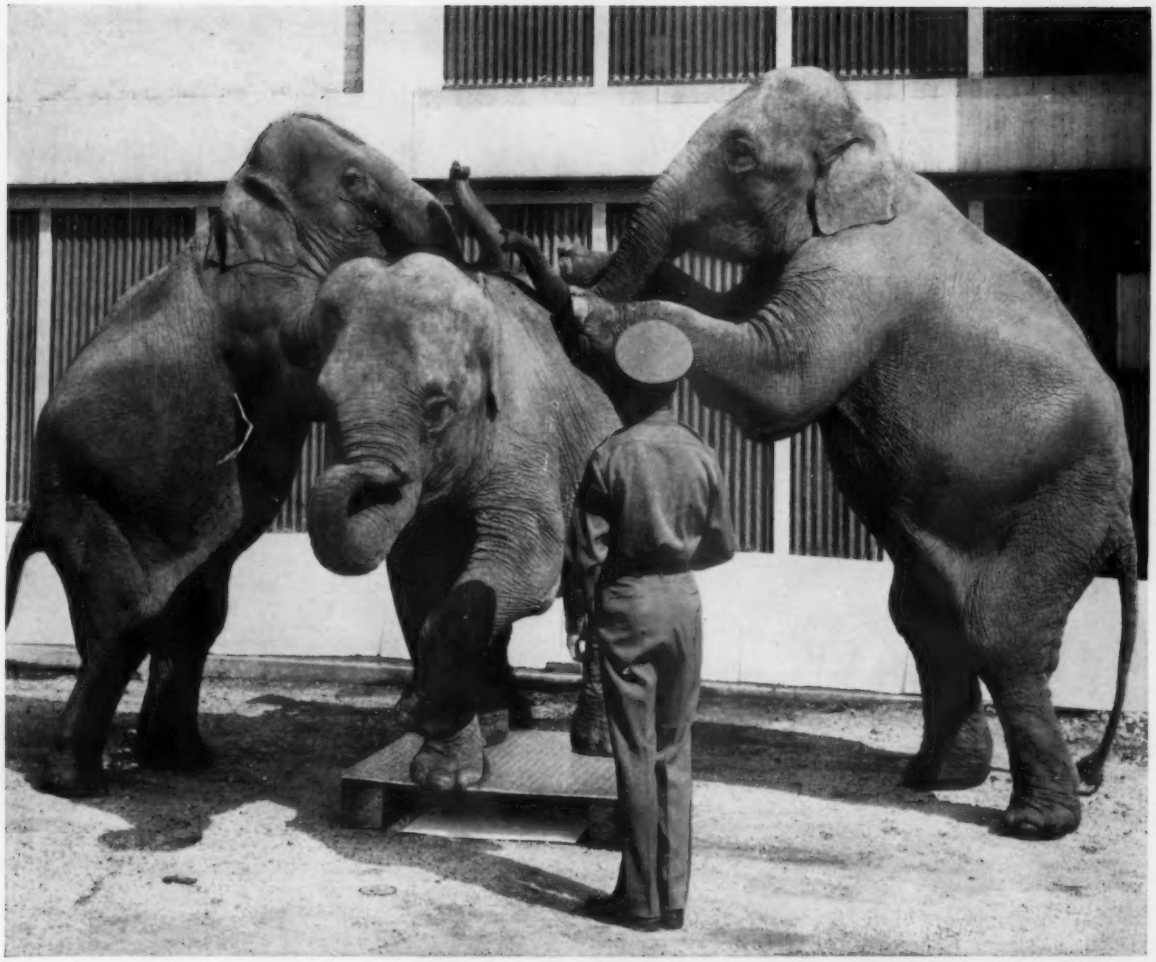
356 Non-Slip Flooring—Algrip, an abrasive rolled steel floor plate described as non-slip even on steep inclines, is the subject of Booklet AL-29, 8 pp. Discusses safety features; gives fabricating data. Alan Wood Steel Co.

357 Steel Grating and Treads—Bulletin 2486, 16 pp, describes types, sizes and load characteristics of company's line of electroforged steel and interlocked aluminum grating and treads. Points out advantages in design and construction resulting in greater safety, pictures applications. Blaw-Knox Co.

358 Data on Panel Material—How to improve factory methods with Masonite Presdwood is discussed in this 12-pp illustrated bulletin. Advantages are listed and types of presdwood used in maintenance and materials handling are indexed. Which type to use and where is covered, application detailed. Masonite Corp.

359 Floor Surface Hardener—Bulletin SH56 describes preparation of Emeri-Topcrete, a hard surface flooring made with company's Type SH Cortland Emery aggregate. Includes recommended specifications and estimating data. Materials, mixing, application and curing information is given. Walter Maguire Co., Inc.

360 Air Tools, Paving Breakers—These two bulletins describe company's latest models of paving breakers and air tools for plant construction and maintenance work. Bulletin PB1 gives features and specifications on heavy-duty, medium-weight and lightweight paving breakers, as well as tools for use with them. Bulletin ST-100 describes and gives specifications for



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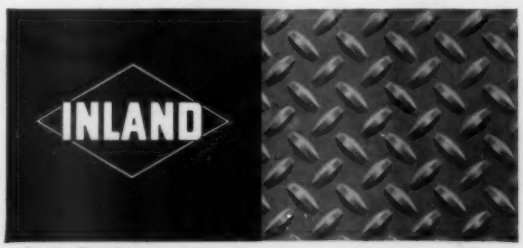

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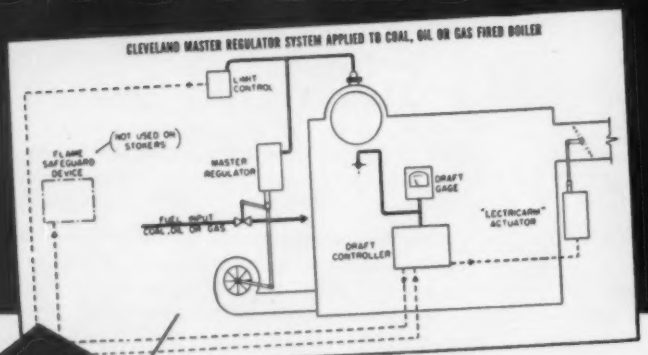

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DATA FILE

(Begins on page 262)

clay spaders, trench diggers and backfill tampers. Gardner-Denver Co.

STORAGE EQUIPMENT

362 **Adjustable Shelving**—How this shelving can save assembly time is explained in 28-pp Form 2111. Photos and drawings of various types of shelving units, including open and closed shelving, bin units, ledge shelving, counter shelving, cabinets with swinging and sliding doors, parts and accessories are included. Standard Pressed Steel Co.

363 **Storage Equipment** — Catalog 100-E, 72 pp, illustrates and describes company's complete line of steel cabinets, folding chairs, chests and safes, stools, tool boxes, work benches, tool stands, shelving, tool storage, lockers, coat racks, filing cabinets, revolving bins, others. Includes dimensions and other specifications. Photos illustrate some typical equipment installations. Lyon Metal Products, Inc.

364 **Storage Shelving**—Rapid erection, strength and other advantages of manufacturer's storage shelving are stressed in this illustrated bulletin. Shows component parts, open types, closed types and some of the many combinations of dividers, bins, doors available. Also presents tool inserts, other shop equipment. DeLuxe Metal Furniture Co.

MAINTENANCE

365 **Basic-Roofing Information**—"What You Should Know About Your Roof" is a 40-pp clearly illustrated booklet which tells what makes a roof fail, how to recognize signs of roof deterioration, what to do to keep a roof in good condition. Discusses recommended roofing practices, essentials of a good re-roofing job. Johns-Manville.

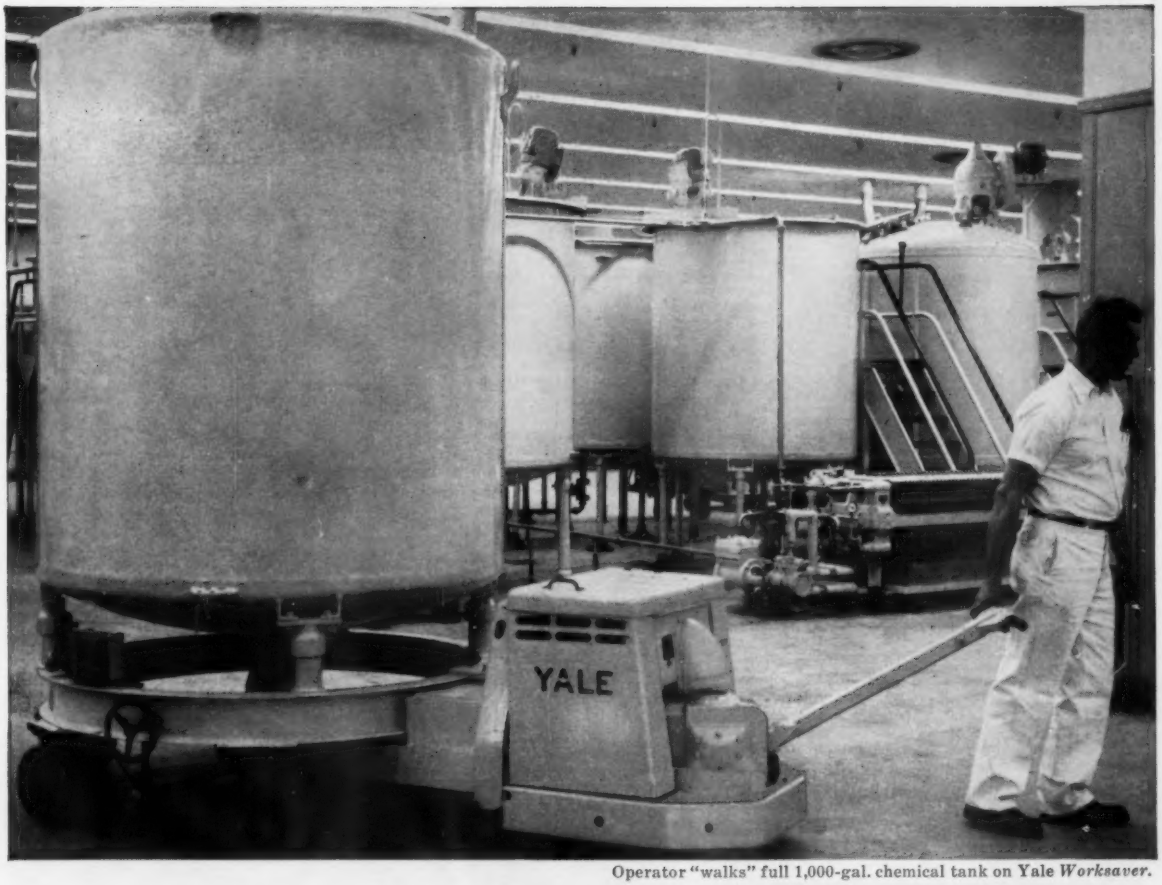
366 **Hot-Dip Galvanizing**—How hot-dip galvanizing is prolonging life of industrial equipment is stressed in this 16-pp booklet. Photos, showing galvanized equipment in use accompany brief text explaining how this process of covering iron and steel with a protective coating of zinc serves to prevent rust. The galvanizing procedure is explained and illustrated. Coating comparison charts show how hot-dip galvanizing compares with other types of coatings as to rust resistance, dimension limits, shock resistance. American Hot-Dip Galvanizers Assn., Inc.

367 **Protective Paint**—Thirty-five case histories of successful use of protective coatings based on chlorinated rubber are included in this 20-pp bulletin, "Protection With Parlon." Photos show water and sewage works, paper mills, storage tanks, and chemical and food processing plants where these coatings have had long-term exposure to corrosive environments. Hercules Powder Co.

368 **Painting with Aluminum**—This helpful booklet discusses advantages of aluminum paints, describes three basic types for non-absorbent surfaces, for weather-exposed wood, and for heated surfaces and those not exposed to weather. Typical maintenance applications are covered in text and picture, and practical suggestions for good results included. Use of aluminum paint on various surfaces is detailed. Aluminum Company of America.

369 **Paint Work Book**—Bulletin 760, about 12 pp, is a practical manual giving painting data in charts, tables, diagrams and illustrations. Factors relating to use of company's protective coatings in mild to severe corrosive service are covered. Coatings and related primers are presented, along with surface preparation, priming, application methods and maintenance instructions. Care and cleaning of brushes and spray equipment is explained. A table gives chemical resistance rating of each coating. The U. S. Stoneware Co.

370 **Building Maintenance** — Handbook 7 offers 64 pp of information on floor surfacing, leak stoppers, external wall sealants, roadpatching, roofing materials. Includes instructions for applying them. Flexrock Co.

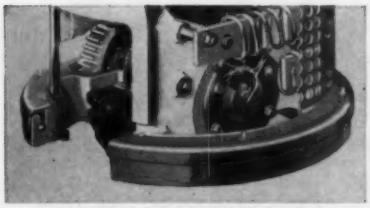


Operator "walks" full 1,000-gal. chemical tank on Yale *Worksaver.*

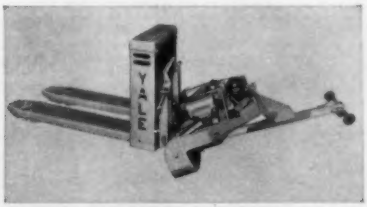
YALE *WORKSAVERS* HANDLE BIG JOBS WHERE CONDITIONS REQUIRE SMALL TRUCKS

Many handling jobs involve bulky loads *(as above)* and transit over low-load floors, on freight elevators and in crammed quarters. These conditions pose problems of load stability, operator safety and tight-space maneuverability—all easily met by Yale *Worksavers.* These light, compact trucks go where big trucks often can't . . . yet have the power and stamina to handle heavy loads on continuous heavy-duty cycles—not only special loads but routine loads up to 7,500 lbs.!

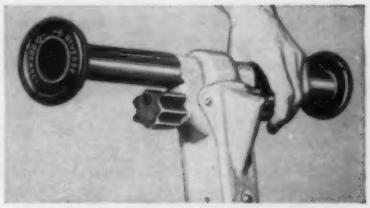
Yale Worksavers are easy to operate . . . have fast power response, jolt-free starts and stops, and steering controls right on the handle. All models are electric hydraulic powered, and include platform *(illus.)*, pallet, tractor and fork lift. Each—whether operating as a multi-purpose "one-truck fleet" or integrated into a complex handling system—smooths the flow of materials from receiving through shipping. For full facts, write The Yale & Towne Mfg. Co., Philadelphia 15, Pa., Dept. A-473.



Powerful drive unit is totally enclosed, and of the double-reduction, spur-geared type. Floats on 105 ball bearings.



"Break-away" for easy maintenance is a feature of latest Yale *Worksaver.* Removal of two pins opens unit for servicing.



"Fingertip" steering handle has two speeds forward and reverse on dual cams. Safety guards on handle protect operator's hands.

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Gasoline, Electric & LP-Gas Industrial Lift Trucks • Worksavers • Warehousers • Hand Trucks • Hand and Electric Hoists

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DATA FILE

(Begins on page 262)

371 **Repairing Concrete Floors** — A seven-step procedure for repairing concrete floors with non-shrink mortar is described in this folder, EPMM-4. Each step is illustrated with an actual photo and description of step involved. Strength comparisons between plain mortar and non-shrink pre-mixed mortar are given. The Master Builders Co.

372 **Better Floor Care** — This illustrated folder describes products designed to aid efficient floor care. Lists combination Scrubber-Vac machines, conventional scrubbing-polishing machines, steel-wool pads, applicators, vacuum cleaners, mop trucks and other mopping equipment. Included are waxes, sealers and cleansers. Finnell Systems, Inc.

373 **Brushless Suction Sweeper**—Dust control features and advantages of using company's floor-type vacuum for large floor areas are presented in this illustrated bulletin. Describes operation, points out typical applications and includes dimensions and specifications. Handling Devices Co., Inc.

374 **Light Scaffolds**—This series of illustrated bulletins describes company's line of aluminum alloy Up-right scaffolds and accessories. Pictures one-piece sections and multi-section models with various ranges of adjustability. Points out such features as locking hooks which provide automatic security and locking casters for safety on stairways and inclines. Up-Right Scaffolds Div., Up-Right, Inc.

SLINGS, CHAINS, WIRE ROPE

375 **Industrial Wire Rope** — Bulletin DH-128D, 24 pp, features wire rope recommendations for industrial services. Covers more than 120 types of wire ropes used in construction, conveyors, cranes, dredges, steel mill and blast furnaces, coal bridges, guy ropes, inclines, platform lift trucks and winch lines. Each recommendation covers such points as rope diameters, construction, preforming, lay, grade and core. In addition, charts covering weights and breaking strengths are provided. American Cable Div., American Chain & Cable Co., Inc.

376 **Sling Chain Handbook**—Illustrated Data Book 100, 32 pp, presents "how to do it" information on sling chains—from ordering to care, use and inspection. Contains diagrams, charts and tables on standard and special styles of sling chains and attachments, and their sizes, weights and working load limits under many conditions. Columbus McKinnon Chain Corp.

377 **Splicing Wire Rope** — Instructions covering the methods used in making various types of wire rope splices are fully detailed in this 16-pp bulletin. Each step in the operation is described and illustrated with easy-to-follow drawings. Additional data is given in the form of tables. Macwhyte Co.

378 **Sling Handbook** — The 64-pp Tuffy Sling Handbook is replete with illustrations, charts and diagrams describing 16 factory fitted slings and nearly two dozen standard fittings available for slings, including several which are recent additions to the line. Book contains a complete rigger's manual, shop chart of ratings, an engineer's notebook and standard signals for directing operations of overhead traveling cranes and derricks and locomotives. A new development featured is the steel ferrule splice now on all Tuffy slings, which affords safety and other advantages. Union Wire Rope Corp.

379 **Wire Rope Cost Control**—The Service-Score System for controlling wire rope costs is the subject of this illustrated folder. Described is an easy method of fact-finding to increase wire rope operating efficiency and help reduce supply and maintenance costs. Sample set of service-score stickers are included. Leschen Wire Rope Div., H. K. Porter Co., Inc.

INSULATION

380 **Piping Insulation** — Seven-pp Bulletin SO 1054 features a snap-on, one-piece molded pipe insulation of fine glass fibers for hot or cold piping. Specifications are given for industrial, commercial, and institutional piping where maximum efficiency is of primary importance and for hot water and low pressure steam. Gustin-Bacon Mfg. Co.

381 **Aluminum Jacketing** — How efficiency can be improved and maintenance cut with weather-proof aluminum jacketing is told in this illustrated bulletin. Applications for insulated lines, towers, vessels, and tanks are described, installation photos and specifications included. Advantages of Lap-Seal feature in providing a positive weather seal are stressed. Childers Mfg. Co.

382 **Pipe Insulation**—Bulletin F 1-100 features on-the-job installation photographs of cellular glass insulation for pipe temperatures between—300 and 800 F. Complete listing of physical properties, condensed specifications are given. Pittsburgh Corning Corp.

VALVES, TRAPS, PIPING AND ACCESSORIES

383 **Bronze Valves**—Globe and angle bronze valves with rising stems, union bonnets and stainless steel plug type seats and discs are described in this bulletin. Discusses design advantages, gives dimensions. The Walworth Co

384 **Diaphragm Valves** — Catalog V-55, 34 pp, covers operation, installation and selection of diaphragm valves for handling of acids, alkalis, gases, volatile and viscous substances, water and other fluids, compressed air vacuum, slurries, semi-solids, beverages and food products. Diaphragm materials are described, selection tables included. Hills-McCanna Co.

385 **Lubricated Plug Valves**—Catalog PV-4, 36 pp, shows in detail a line of iron and steel lubricated plug valves. Many illustrations of single, screwed and bolted gland type valves are shown, including photos, sectional and detailed drawings. Also included is physical data on dimensions, ratings. The Wm. Powell Co.

386 **High Pressure Valves**—Bulletin B-451, 12 pp, contains complete engineering data on company's valves for high pressure and high temperatures. Typical installations are pictured, dimensions and weights are tabulated, and temperature-pressure ratings are shown. A selection table is included, as well as information on materials, design. Yarnall-Waring Co.

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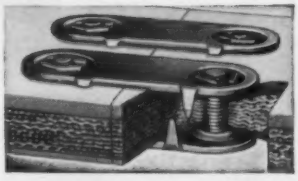

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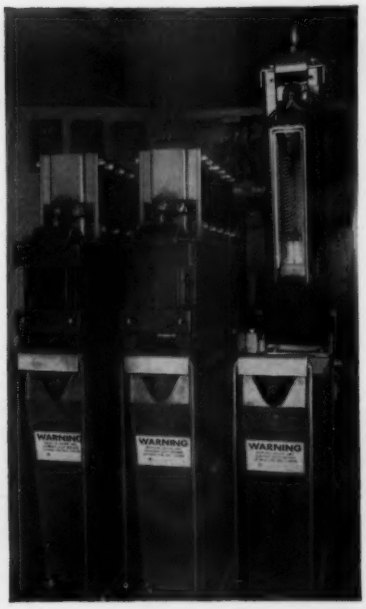

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DATA FILE

(Begins on page 262)

387 **Valve Performance Facts**—Included in this 36-pp booklet are 32 case histories of cost-saving valve installations. Service applications covered include steam, oil, water, coating fluid, chlorine, phenol, pulp stock, vacuum, others. Industries include paper mills, refineries, central stations, other plants. Crane Co.

388 **For Quick Valve Selection**—Here's a 20-pp catalog digest providing ordering and application information, on gate, globe, angle and check valves in bronze, iron, cast and forged steel construction, also valve accessories and parts. Illustrated, includes pressure temperature chart. The Ohio Injector Co.

389 **Corrosion Resistant Valves**—Monel and nickel corrosion-resistant valves are described in Bulletin 9. Discusses corrosion-resistant properties of Monel and nickel, listing specific application for which each is suited. Gives casting composition of both alloys and describes their mechanical properties. Cross-sectional illustrations of gate, globe and check-type valves are included. Alloy Steel Products Co.

390 **For Valve Selection**—Circular 555, 24 pp, is designed as a guide for selecting valves, boiler mountings, and lubricating devices, including the LQ600 bronze globe valves, Luncor PVC all-molded valves, and solder end valves. Tables, technical data and information on the selection of valves, boiler mountings, and lubricating devices are completely indexed for easy reference. The Lunkenheimer Co.

391 **Control Valves**—Air and hydraulic control valves designed for high-speed, rugged performance are the subject of 6-pp Bulletin 561. Advantages are pointed out and a number of different models are illustrated, including single solenoid valve, double solenoid valve, pilot operated valves, and lever operated valves. A drawing illustrates design and construction features. C. B. Hunt & Son, Inc.

392 **Valve Data**—This loose-leaf notebook contains a collection of company's bulletins on its line of valves for control of air, gas, liquids and solids. It features complete operating, design, dimensional and specification data on butterfly, slide, automatic and proportioning valves, and is profusely illustrated with photos, drawings and diagrams highlighting valve design. W. S. Rockwell Co.

393 **Steam Trap Solutions**—Bulletin F-151, titled "Solving Steam Trap Problems," is a 36-pp illustrated booklet giving specifications and capacities of steam and float traps, air release valves, pipe line strainers. Tells how to calculate condensation loads and select traps for unit heaters, jacketed kettles, submerged surfaces. Gives pointers on installing and servicing traps. Also included in this edition is information on combination flat and thermostatic traps. The V. D. Anderson Co.

On pages 257-258 are two postage-free Reader Service Cards provided for your convenience in ordering these catalogs. You may also use the cards to order any literature mentioned in ads.

394 **Steam Trap Book**—Catalog J is a 44-pp manual and ordering guide in which 17 pp are devoted to data on fundamentals of good trapping and trap selection. Installation and maintenance instructions are also provided. Book lists steam traps for maximum pressures of 250, 600, 900, 1500 and 2500 psig. Included, also, is a section on trouble shooting. Armstrong Machine Works.

395 **Steam, Air and Gasoline Traps**—Catalog 751, 32 pp, is a trap ordering book with capacity tables, installation diagrams, and containing charts and formulas for determining proper size trap for specific applications. Covers thermostatic steam traps, expansion steam traps, weight-operated traps for steam, air, gasoline, pressure up to 1500 lb. W. H. Nicholson & Co.

396 **Unions, Check Valves**—Illustrated Catalog 55, 24 pp, describes and provides ordering information on a line of forged steel unions and check valves. Socket-weld, high-speed, orifice, O-ring and other unions are included. Catalog provides service recommendations, dimensions and list prices. Also included is table covering discharge of water to atmosphere. Clayton Mark & Co.

397 **Improved Hose Coupling**—A quick connect-disconnect hose coupling for water, oil, steam, gas and chemical lines is described in this 16-pp bulletin. Describes the coupling's construction and explains how it provides a sealing action which makes the coupling tighter as internal pressure increases, and a full swiveling action. Titeflex, Inc.

398 **PVC Pipe Fittings, Flanges**—This is a comprehensive 12-pp catalog on corrosion resistant pipe fittings and flanges in normal- and high-impact grades, rigid, unplasticized polyvinyl chloride. Shows characteristics, advantages and limitations. Lists operating pressures, temperatures, applications, price comparisons, fabrication advice, installation and supporting recommendations, dimensions and weights. Grinnell Co., Inc.

399 **Pipe for Modern Buildings**—This 16-pp booklet discusses wrought iron pipe for modern buildings. Identifies wrought iron pipe and describes composition and advantages. Included are sections on wrought iron's resistance to corrosion and fatigue stresses, weldability, forming and threading, as well as the application of protective coatings to the material. Pictures illustrate applications. A. M. Byers Co.

400 **Coupling Data**—Bulletin 240 describes a quick-connect, quick-disconnect H coupling, its uses and construction, with particular reference to U-packer which gives positive seal without compression set because of rubber distortion. A fully detailed cutaway of coupling is included and dimensions and ordering information given. Snap-Tite, Inc.

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Greenwood Mills, Greenwood, S. C., uses over 100,000 sq. ft. of .006" Childers Jacketing to protect insulated lines at its newly-completed Mathews Plant.

W. L. Bross, Chief Engineer at Greenwood Mills

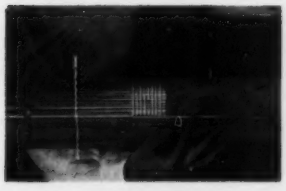
...protects insulated lines, decreases heat loss, improves appearance

Leading power plant engineers are discovering to their profit that insulation on steam lines *lasts far longer* when protected with Childers Aluminum Jacketing. This durable jacketing eliminates costly maintenance and repairs. It protects the insulation indefinitely against damage from workmen, equipment and dripping fluids like oil and grease. Outside lines covered with Childers Jacketing are safe from exposure to weather. Periodic inspection of the insulation is easy with the removal of any section of jacketing.

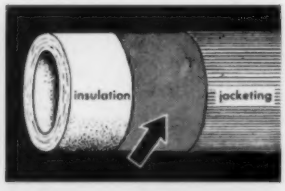
Childers Jacketing on power plant lines and equipment has the added benefit of *effectively reducing the heat lost by radiation.* Engineers have determined that Childers Jacketing improves the efficiency of insulation and therefore decreases fuel consumption. The result is fewer BTU's lost per KWH.

With Childers Jacketing, older power plants, as well as new, take on a trim, modern appearance. Unlike ordinary sheet aluminum, Childers Jacketing has a 3/16" cross corrugation rolled in it. This cross-crimping reduces glare, makes dirt less visible. Housekeeping is easier — your plant is always a credit to the community.

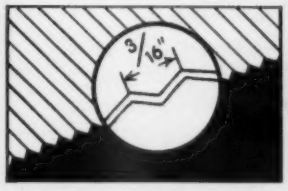
Write: Childers Manufacturing Co., Dept. PLE-9, 3620 West 11th St., Houston 8, Texas.



LAP SEAL, available at no extra cost, is a series of 8 ribs rolled into the underlapping edge of the jacketing, providing an automatic measure of the 2" circumferential lap. Proper lap is insured without waste. Labor is saved. Where desired, a positive weather seal is easily made with Lap Seal and a mastic.



FACTORY-ATTACHED MOISTURE BARRIER protects the underside of aluminum from possible attack by alkaline solutions present in most insulating materials. The moisture barrier, bonded at the factory by continuous strip adhesive, adds little to cost, saves application labor, insures against underneath corrosion.



TESTS PROVE EXTRA STRENGTH of rolled-in 3/16" cross corrugation. Vertical strength and rigidity of a .016" sheet with this 3/16" cross corrugation are increased to that of a plain .024" sheet. Jacketing costs are consequently reduced by as much as 1/3 when Childers Jacketing is used instead of ordinary sheet aluminum.

CHILDERS HEAVY WEIGHT ALUMINUM JACKETING is recommended for extra protection of lines along walkways and other areas subject to physical abuse. Also recommended for protection of insulated towers, vessels and tanks. Only Childers offers .019" Heavy Weight jacketing in labor-saving 4' wide rolls.

For more facts circle 694 on Reply Card

DATA FILE

(Begins on page 262)

401 **Bellows Design Guide**—Twenty-pp Catalog 155 contains helpful information on applications, design considerations, and standards for metallic bellows. Details on using bellows manufactured from various metals are included. Tables supplement text. Flexonics Corp.

402 **Jointed Clay Pipe**—Advantages of jointed vitrified clay pipe designed to limit and control leakage of ground water in sanitary systems are described in this illustrated bulletin. Performance characteristics are discussed and typical installations are pictured. American Vitrified Products Co.

FANS, VENTILATING

403 **Industrial Fans**—Propellair Bulletin 650, 12 pp, contains dimensions, application, and performance data on Tubeaxial and Stackbooster fans. Gives information on cooling and drying problems, system and open surface tank ventilation. Robbins & Myers, Inc.

404 **Standard Duty Fans**—Designs and construction details of company's line of standard duty fans are covered in 28-pp Bulletin 543. Points out advantages, shows arrangement and application, describes accessories. Tables list specifications. The New York Blower Co.

405 **Industrial Fans**—Bulletin 702A features company's line of fan equipment for industrial air and material handling applications. Photos illustrate various types available, and complete descriptive detail and a table of general data are included. Clarage Fan Co.

406 **Induced Draft Fan Data**—In addition to providing an illustrated discussion of design advantages of company's induced draft Bifucator, 20-pp Bulletin DB-44-56 is an excellent working tool on fan selection. Two methods are presented, along with detailed examples of each. Also included are boiler code ratings of various organizations expressed in Btu/hr, and charts on draft losses. Dimensional diagrams are provided, as well. Typical installations are pictured. DeBothezat Fans Div., American Machine and Metals, Inc.

407 **Ventilating Equipment**—A 36-pp guide to selection of propeller fan type ventilating equipment, Catalog 152 includes specifications and installation data on company's propeller fans in portable, tubeaxial, centrifugal, roof ventilator and other types. Detailed illustrations of construction features accent design and performance factors. Case study photos show installations. Ilg Electric Ventilating Co.

408 **Roof Ventilators**—Sixteen-pp Bulletin A-112, revised, covers manufacturer's line of reversible roof ventilators, also penthouse Vertijet, rotary and other models. Sizes, specifications, performance data and dimensional drawings are included. Hartzell Propeller Fan Co.

DUST CONTROL

409 **Dust Control**—"Engineered Efficiency in Dust Collection and Recovery," 36 pp, discusses industrial dust recovery from standpoint of nuisance abatement, waste avoidance, hazard elimination. Shows effect of variation in particle size, distribution and specific gravity of dust on efficiency of the dust collecting system. Buell Engineering Co., Inc.

410 **Dry-Type Filters**—Bulletin 600, 8 pp, describes company's Staynew ventilation and air conditioning filters. Specifications, engineering, performance and installation data covering dry type panel filters for the removal of air-borne impurities given. Dollinger Corp.

411 **Dust Filter**—Advantages offered by company's type RJ dust filter are listed in Bulletin 560. A cutaway view points out construction details and table lists capacity ratings. The Day Co.

412 **Industrial Dust Control**—A wide variety of collection methods for industrial dust control is described in 16-pp Bulletin 922. A typical case history is included, as well as photos, cutaway views, drawings and capacity data on the various units. Pangborn Corp.

413 **Dust Control Systems**—Valuable engineering data on methods of dust control as well as descriptions of company's line of dust collectors are contained in illustrated Bulletin 636-2. Specifications on all models are included. Aget Mfg. Co.

414 **Dust Collectors**—Operation, construction, versatility and maintenance of company's unit dust collectors are explained in this bulletin. Includes capacities, sizes. The Kirk & Blum Mfg. Co.

415 **Hydro-Filter**—Bulletin 556 describes outstanding feature of company's hydro-filter for industrial dust collection. Cutaway view shows construction and design details, and diagrams showing dimensions and a table of capacities included. National Dust Collector Corp.

416 **Flexible Hose**—A set of five bulletins (Nos. 40 through 44) are of interest to plant engineers concerned with the design, installation or purchase of flexible hose for dust and fume control, air conditioning and materials handling. They provide general information, data on installation, application suggestions, technical data and prices on hose, duct and accessories. The Flexaust Co.

417 **Precision Air Cleaning**—Design and principles of air filtering employed by company's air filter are covered in this loose-leaf file of bulletins. Includes data on test dust used to determine capacity, loading characteristics, resistance, air cleaning performance of all types of mechanical air filters. Applications are listed and complete specifications included, as well as efficiency charts. The George Evans Corp.

MATERIALS HANDLING

418 **Electric Hoists**—Twelve-pp Bulletin DH 133B describes Speedway electric hoists of 500- to 4000-lb capacities. Fully illustrates and

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DATA FILE

(Begins on page 262)

explains design features and gives details on suspensions and conducting systems. Clearance data, specifications included. Wright Hoist Div., American Chain & Cable Co., Inc.

419 **Overhead Cranes**—Bulletin T202, 20 pp, gives full information on top running double girder cranes with top running trolley in capacities from 2 to 12 tons, spans to 60 ft. Data is also given on top running single girder cranes, both motor driven bridge types and head geared or push type in capacities from 1 to 10 tons, spans to 50 ft. Features which contribute to efficient operation and low maintenance costs are detailed. Electrical information included. Chicago Tramrail Corp.

420 **For Overhead Handling** — Booklet 2008-M, 12 pp, is replete with illustrative material on principal components of overhead handling systems. Track design and advantages of supporting it flexibly are described, and formulas and figures for comparing various track sections are included. Among subjects covered are various carriers for hand, electric and automatic operation; tractors; track switches; standard cranes, transfer cranes and gantry cranes; safety electrification; buckets and grabs. Cleveland-Tramrail Div., The Cleveland Crane & Engineering Co.

421 **How to Choose a Crane** — Designed to aid in the selection of overhead cranes, 8-pp Unit 79 shows how to analyze handling problems, decide on the type of crane desired and draw up specifications for crane proposals. Basic data is provided on classes of crane service, crane ratings and capacities and recommended speeds for bridge, trolley and hoist, along with standard dimensions and clearances. Gives 14 safety features. Whiting Corp.

422 **Electric Hoists** — This illustrated brochure describes company's line of electric hoists designed for big-lift applications. A large cut-away view showing component features is included, as well as photos of typical applications. R. G. LeTourneau, Inc.

423 **Standard, Special Conveyors**—Catalog 400, 20 pp, describes standard and special conveyors for a variety of materials handling applications in industry. Photos of typical installations illustrate roller conveyors, wheel conveyors, live roller conveyors, belt conveyor, pusher bar conveyor, elevating equipment, overhead cable trolley, overhead chain trolley, special handling equipment, slat conveyor, drag chain conveyor, bulk handling equipment. The E. W. Buschman Co.

424 **Steel Conveyor Belts**—"A profitable approach to the selection of steel processing conveyor belts" is the subject of this 16-pp bulletin. Simplified selection, standard specifications, and installation information are included. Photos and diagrams illustrate the text. The Colorado Fuel and Iron Corp.

425 **Engineered Conveyors**—Bulletin 156, 8 pp, discusses design and performance of company's material handling and production systems, engineered to solve specific problems in the handling and production of various materials. Covers overhead conveyors, ultra time and synchronized conveyors, trans-free conveyors, TV tube settling conveyors, pig stacker, others. Allied Steel and Conveyors Div., The Sparks-Withington Co.

426 **Engineered Conveyor Systems**—Catalog 835, 32 pp, illustrates conveyor systems in use in a wide range of industries, showing how they suit handling requirements involved. Roller, wheel, belt, chain, overhead trolley and elevating conveyors are included, also spirals, portable power conveyors, ball transfers and special equipment. Mathews Conveyor Co.

427 **Conveyor Belt Chart**—Engineering data for standard conveyor belt construction is given in this chart and accompanying sheet. Strength characteristics of eight popular ply and material combinations of conveyor belt constructions are provided. Each property is printed on the chart in a different color to facilitate comparison. Quaker Rubber Corp., Div., H. K. Porter Co., Inc.

428 **Lift Truck Work Kit** — A method of predetermining the time necessary for fork-lift trucks to perform specific operations is provided in this work kit, designed to enable plant engineers to apply fork lift truck standard performance data. It can assist in determining efficiency of fork lift trucks now in use as well as in planning for future needs. Includes typical materials handling examples to show technique for application of the data, as well as charts providing times for basic truck motion elements. The Yale & Towne Mfg. Co.

429 **Load Handling Equipment**—Bulletin 406, 24 pp, covers company's Budgit, Tugit and Load Lifter products and other load handling specialties. Catalog numbers, sizes and specifications are tabulated, and application photos of the various products are included. Complete specifications and principal dimensions are indicated on tables. Manning, Maxwell & Moore, Inc.

430 **Oil-Hydraulic Lifts** — Catalog RE-203, 20 pp, covers the field of heavy-duty oil-hydraulic lifting devices for industrial applications. Featured in catalog are company's standard Levelator lifts, a 6000 lb single-jack model and a 12,000 lb dual-jack lift. Also featured is an electric pump mounted on an oil tank for powering oil-hydraulic devices. Illustrates lift platforms, platform accessories and safety devices, jacks, power units. Rotary Lift Co.

431 **Shock Absorbing Casters** — Twenty-pp Catalog FH-53 describes construction features of company's Floating-Hub casters, listing types and mountings now available. Load ratings for each type and size are provided. Stresses, by text and illustration, how these shock absorbing casters work, permit smooth travel over rough floors. The Bassick Co.

432 **Industrial Casters** — Various types of casters for industrial applications are pictured and described in this large chart designed for wall mounting. Covers light duty, light-medium duty, medium duty, medium-heavy duty, heavy duty, extra heavy duty, trailer series, and special duty casters, and includes complete selection tables. Faultless Caster Corp.

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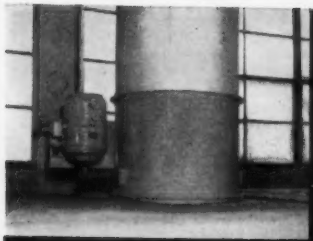

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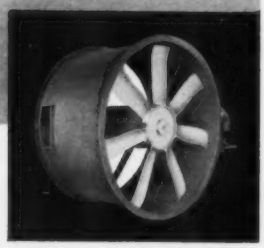

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Installed at the Columbus, Ohio plant of North American Aviation, Inc., new Aerovent "SP-7" Belt-Driven Duct Fans, with 7-blade "Macheta" Airfoil Propellers, remove acrid fumes and vapors from a spray-type processing machine. At temperatures of 180° to 200° F., the solution flashes into steam and noxious fumes which would contaminate the entire area if unabated. Located above each end of the spray section, and at intermediate points, the fans induce a steady flow of air through the unit to trap and remove heavy vapors at their source.

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DATA FILE

(Begins on page 262)

433 **Casters and Wheels**—Catalog 138 is a 191-pp product manual on company's line of casters and wheels, describing design features and listing full specifications. Photos and drawings are used profusely to illustrate data, covering furniture casters, wheels, glides, desk shoes and various accessories. Darnell Corp.

PACKINGS, GASKETS, SEALS

434 **Teflon Products**—Three bulletins present this company's Teflon packings, gaskets, special parts and stock. Bulletin CP552 describes Chempro lines of Teflon ring packing, Teflon impregnated asbestos packing, V-type packing and Teflon seal cage for use with acids and strong chemicals. Bulletin CP553 covers Teflon jacket gaskets, solid ring gaskets, expansion joints and special gaskets. Bulletin CP554 illustrates special parts. Chemical & Power Products, Inc.

435 **Packings for Chemicals**—Dura Plastic Teflon packing for sealing applications in the handling of corrosive chemicals is introduced in Bulletin 461 M.D. Stresses heat resistance of the material, chemical inertness. Discusses construction details and lists packings for use with specific chemicals. Durametallic Corp.

436 **Mechanical Seals** — Bulletin AD-150, 8 pp, features complete data on Type BB-21A Mechanipak seal. Tells how it works and illustrates operation and design features with cutaway drawings. Typical applications are listed and specifications are tabulated. The Garlock Packing Co.

PUMPS, COMPRESSORS

437 **Condensed Pump Data** — Form 4383-J covers more than 20 types of general service pumps, rotary pumps, sump and drainage pumps, condensate units, self-priming units, stainless steel pumps and high-pressure pumps. In easy-to-find tabular form, each model is pictured along with its characteristics, applications and features. Goulds Pumps, Inc.

438 **General Purpose Pumps**—Section B, 36 pp, describes rotary pumps for general purpose use. Explains positive displacement principle incorporated, gives suggestions for selecting proper materials of construction. Application and ordering information is provided on mounted and unmounted small pumps, large mounted pumps, pumps for operations requiring greater sealing, and large, totally enclosed models. An engineering section covers recommended speeds and capacities. Viking Pump Co.

439 **Continuous Flow Pump**—Bulletin 30-C, 8 pp, outlines advantages of company's Moyno pumps which handle a variety of materials—from free-flowing liquids to non-pourable pastes, abrasives, solids. Describes principle of operation, discusses performance, construction, capacities, and includes photos, diagrams and specifications. Robbins & Myers, Inc.

440 **Condensation Pumps**—Eight-pp Bulletin 1403 describes company's line of condensation pumps for use in low and medium pressure-heating systems and steam-process equipment. Photos, drawings and other technical data on capacities and dimensions pertaining to construction, application and installation are included. Dunham-Bush, Inc.

441 **Close Coupled Pumps**—Revised Bulletin 242 describes design and operation advantages of company's close coupled pumps for industry, and includes large cutaway views illustrating component features. A composite rating table is included, as well as dimensions and other data. Warren Steam Pump Co., Inc.

442 **Industrial Compressors**—Bulletin SSB-56 covers company's complete line of industrial air compressors from the 1/2 hp to 150 hp, including the accessories that go to make a complete installation. Photos of the various models are included, as well as specifications and dimensions. Schramm, Inc.

443 **Air Compressors**—Bulletin A-62, 20 pp, covers construction, operation information on company's class WN-112 heavy-duty air compressors. Illustrates five models of compressor, for displacement capacities from 368 to 974 cfm at sea level, and four high altitude models for 532 to 1100 cfm. Joy Mfg. Co.

444 **Portable Compressors**—Twelve-pp Catalog GG-9A pictures 40 models of company's portable type compressors. A quick reference chart shows capacities, engine types, and mountings available. Illustrates such features as: replaceable cylinder sleeves, interchangeable valve parts, aircraft type compressor cylinders, heavy duty industrial type engines. Le Roi Div., Westinghouse Air Brake Co.

Postage-free Reader Service Cards make it easy to order catalogs. Cards are provided on pages 257 and 258.

445 **Gas-Engine Driven Compressors** — A two-cycle turbocharged compressor is described in 24-pp Bulletin 134. Stresses economy of installation and operation afforded by this gas-engine driven unit, lists other advantages. Explains how turbocharging saves on fuel and cooling. Design and construction features are discussed. Clark Bros. Co.

446 **For On-the-Spot Air**—Eight-pp Form 2302 features company's self-contained Spot-Air portable compressor. Deals with the many tools it will operate, with actual on-the-job illustrations pointing out added advantages of this light-weight compressor on jobs where bigger compressors are not needed. Ingersoll-Rand Co.

447 **Compressor Data**—Feather valve compressors from 75 to 350 hp are described in 32-pp Bulletin L-676-B1A. Advantages on installation, operation and maintenance costs are outlined for types YC and DYC compressors.

UTILITY BLAST CLEANING CABINET

Here is a cabinet of many applications. Designed for tool room use, deburring, removing rust and scale, producing matte' finishes, cleaning heat-treat scale. Also used for removal of carbon deposits when used with soft grit abrasives. Many laboratories use this equipment for experimental work, samples, testing, etc. Furnished complete with dust filter, fan and 1/4 HP motor. Sanitary. Compact.

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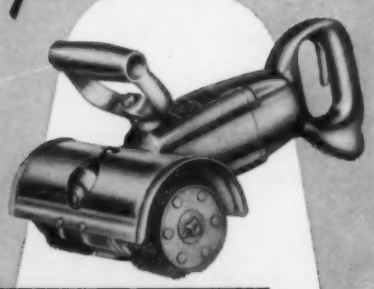

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The Aftercooler and Separator that assures

DRIER Compressed Air

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Yes, *Royal* Adjustable Chairs and Stools bring to the assembly table, drafting room, factory office, and production machine a complete array of sturdy steel seating designed by correct-posture specialists.

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DATA FILE

(Begins on page 262)

Information and illustrations are offered on component parts, including frame, running gear parts, intercooler, crosshead, motor and main bearings and various cut-away views are included. Variable capacity control information is listed along with data on governors. Diagram illustrates correct selection and coordination of auxiliary equipment. Worthington Corp.

WATER TREATING

448 **Feedwater Treatment**—Process Bulletin B1, "Treatment of Boiler Feedwater by the Direct, or Internal Method," discusses advantages of direct treatment, as a complete treating program or as a supplement to external systems. Explains why direct treatment is convenient, economical, and complete, and points out how it improves steam quality and reduces maintenance. National Aluminate Corp.

449 **Mixed-Bed De-Ionization** — Practical equipment for mixed-bed de-ionization at flow rates of 5 gal per hr to 5000 gpm is described in this 8-pp illustrated bulletin. Advantages of the mixed-bed de-ionizer are detailed, and installation and mechanical construction features discussed. Illinois Water Treatment Co.

450 **Industrial Filters**—How industrial filters can lower production costs is the theme of 10-pp Bulletin 651. Several simple case histories—from filtering city water to the filtering of recirculation water from cooling towers and spray ponds — are cited. Company's new line of IWF filters is featured, including sectional views, typical installation, drawings, dimension charts. R. P. Adams Co., Inc.

BOILERS, GENERATORS

451 **Packaged Boilers**—This 16-pp illustrated catalog describes manufacturer's new Type VP Package boiler. Following a section of background information, is an outline of principal design features of these boilers, which are shop assembled and provide steam capacities from 4000 to 40,000 lb per hour. Space requirements are shown in a table along with specifications. Combustion Engineering, Inc.

452 **Standard Generators** — Bulletin B-55-4 describes company's SC economy series of standard steam generators, designed to reduce steam costs for industrial plants. Pre-engineered, standardized steam generators offered in nine sizes, with capacities of from 50,000 to 150,000 lb per hour are described, and schematic and cutaway drawings of the units and design features are included. Foster Wheeler Corp.

453 **Shop Assembled Boiler** — Sixteen-pp Bulletin G-76 completely describes and illustrates company's Type FM water-tube integral-furnace boiler, made in standard sizes from 2900 to 28,000 lb of steam per hr, pressure to 250 psi. The Babcock & Wilcox Co.

454 **Self-Contained Boilers** — Bulletin AD-144 reviews company's new CB boilers. Illustrations include installations, demonstrations. Engineering articles are featured covering such subjects as low noise level. Cleaver-Brooks Co.

SPACE, PROCESS HEATING

455 **Plumbing, Heating Supplies—Edition H** is the current edition of this company's 126-pp general catalog on plumbing and heating repair parts, tools and accessories. Indexed and generously illustrated; gives sizes, intended uses. J. A. Sexauer Mfg. Co., Inc.

456 **On Unit Heaters**—Latest improvements, specifications and performance data for Herman Nelson horizontal and vertical unit heaters are covered in 36-pp Bulletin 700A. Includes complete hot water and steam performance tables, dimensions, selections, applications, descriptions of cabinets, elements, motor mountings, fans and accessories, controls. Also provided are suggested layouts, piping diagrams, other data. American Air Filter Co., Inc.

457 **Revolving Unit Heaters**—Bulletin HR-6A, 16 pp, features revolving unit heaters for industrial plant heating, presenting design and construction details and showing typical installations. Engineering data, mounting heights and coverage, and dimensions are tabulated, and dimension drawings are included, along with installation planning tips and specifications. L. J. Wing Mfg. Co.

458 **Unit Heaters** — Catalog 155, 32 pp, presents unit heaters for steam and hot water in vertical and horizontal delivery and power-throw types. Covers design features and provides performance and capacity data. Also provides information on unit heater selection, sound ratings, locating unit heaters, motor wiring and control. Piping and installation suggestions are included as well as typical unit heater specifications. Modine Mfg. Co.

459 **Electric Heating Units** — Catalog 50, 50 pp, contains complete engineering data on electrical heating units and equipment, including strip elements, finstrip elements, tubular elements, cartridge elements, ring elements, immersion heaters, circulation heaters, radiant heaters, forced air, duct heaters, unit heaters, hot plates and others. Includes photos, dimensional drawings, price and standard rating tables and other specifications. Edwin L. Wiegand Co.

460 **Industrial Ovens**—Engineering, manufacturing and installation of processing ovens are described in Bulletin D-53-20, 16 pp. Covers oven types, application to industry source of heat, selection of heater, control of heat, distribution of heat. Photos show typical oven installations, and a complete modern finishing process is presented. Newcomb-Detroit Co.

INSTRUMENTS, CONTROLS

461 **Temperature Controls** — Eight-pp Catalog CC, on temperature controls and allied equipment for heating and refrigeration, provides information on recording, indicating, non-indicating controls; thermometers; bulb installation accessories; process timers, and gas pilots. Includes prices and references to detailed literature. The Partlow Corp.

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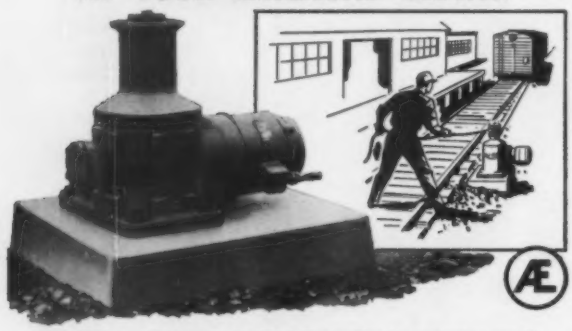

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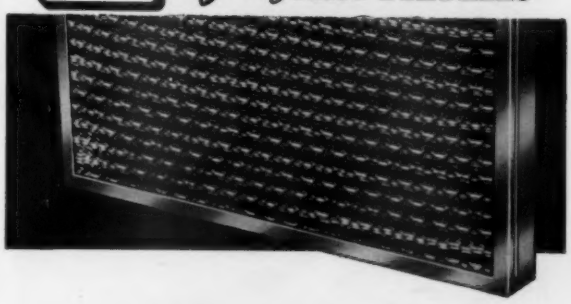

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DATA FILE

(Begins on page 262)

462 **Versatile Electronics**—How flexibility of electronic temperature controls makes them useful in a wide range of heating and air conditioning installations is explained in this 16-pp booklet, Bulletin SA-2681. Purpose of publication is to fill the gap between the theory of electronic bridge circuits and specific control layouts and circuit diagrams. Four basic features that give electronic control its flexibility and broad application are described. Minneapolis-Honeywell Regulator Co.

463 **Service Regulators**—Revised Bulletin 1026, 20 pp, features company's line of service regulators. Rate-of-flow graphs illustrate mathematically the determination of maximum outlet pressure build-up and amount of gas relieved to atmosphere by extra safety device in case of failure of regulator. Rockwell Mfg. Co.

464 **For Industrial Metering**—Practical selection and application data on meters for industrial liquids are provided in 20-pp Form 566. Explains value of metering in batch mixing, process and cost control. Illustrated charts show how to select and proper meter according to type, temperature and flow rate of liquid to be metered, and include specifications for models shown. Strainers, valves and other accessories are described. Neptune Meter Co.

465 **Combustion Controls**—Included in this catalog (about 16 pp) are product descriptions of company's combustion instruments and controls. Covers damper controls; drive units; draft, air pressure and flue temperature gages; steam controls; panel board cabinets; low-draft cut-off switches. Pages are fully illustrated to show design and operational details, and brief text includes application suggestions, special features. Cleveland Fuel Equipment Co.

466 **Scale Selection**—A variety of scales are presented in Catalog 651. Contains complete technical information on dormant platform, portable and bench scales. Also describes and illustrates meat packing, motor truck and dairy type scales. Introduces a heavy-duty scale with air-controlled filling device which measures light or heavy oils, chemicals, paints, varnishes, syrups and other liquids at the touch of a button. Detecto Scales Inc.

467 **Overheat Protection**—Bulletin MOPR-1, 8 pp, describes design and operation features of inherent overheat protectors—small devices built into electric motors to turn power off when windings get too hot. Includes photos and wiring diagrams illustrating operation. Metals & Controls Corp.

468 **Contour Projectors**—The use of projection or optical gaging with company's contour projectors is discussed in this illustrated bulletin. Points out chief advantages and describes typical applications. Specifications and dimensional diagrams for a number of models are included. Eastman Kodak Co.

FILTERING

469 **Filters, Strainers** — Industrial Catalog 1054, 48 pp, provides application and engineering information on company's line of microfilters and precision strainers. Fuel filters, full flow and by-pass lube filters, air separators, and metal edge strainers for fuel lube and industrial use are presented along with construction details, performance data, and specifications. Purolator Products, Inc.

470 **Filter Fabric Facts** — This 16-pp illustrated booklet contains information about filtration principles; filtering devices; filter media; textile fabrics for filtration; a comprehensive chart on chemical and heat resistance of cotton and synthetic fabrics; sections on yarns, fabrics construction and finishing; and a round-up of filter fabrics in use. Wellington Sears Co.

PLASTICS, SYNTHETICS

471 **Super Polyethylene**—A new type of polyethylene which has greater heat resistance, greater structural stiffness, and better appearance than previous types, is the subject of 16-pp Bulletin C-5-216. Properties of the thermoplastic material are detailed, as well as uses. Chemical Div., Koppers Co., Inc.

472 **Synthetic Fluids, Lubricants** — Form F-6500D, 52 pp, on synthetics, covers properties, applications, and characteristics of these poly-alkyline-glycol derivatives. Describes uses as mechanical lubricants, hydraulic fluids, rubber and textile lubricants, heat-transfer fluids, anti-foam agents, solvents, and formulation components. Engineering data is presented in the form of tables and charts, and application photos included. Carbide and Carbon Chemicals Co., Div., Union Carbide and Carbon Corp.

473 **Solution Resins**—This folder contains a series of bulletins on solution resins, covering six Exon vinyl chloride resins for solution coatings. Outstanding characteristics of each resin are described and a graph showing the solubilities of these resins in methyl ethyl ketone is included. Solution viscosity tables, data on formulating and other information included. Chemical Sales Div., Firestone Plastics Co.

OTHER EQUIPMENT

474 **After Cooler**—Bulletin 130, 8 pp, explains functions of company's Aero after cooler in removing moisture from compressed air and gas. The apparatus is described and illustrated with diagrams and photos. Included also are diagrams and illustrations of applications in liquefication systems. Niagara Blower Co.

475 **Fighting Corrosion With Corrosion**—Cathodic protection against rust and corrosion is the subject discussed in this illustrated 10-pp bulletin. Describes the corrosion battery, corrective measures, cathodic protection battery, and includes design and application data. Electro Rust-Proofing Corp.

476 **Equipment Selector Charts** — Bulletin CE-50, 20 pp, contains selector charts on corrosion-resistant equipment for process industries. Tables cover general considerations in selection of material, physical properties, cor-

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Non-Shrink EMBECO
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Outlasts and outwears plain cement-sand patches because . . .

- *Does not shrink* upon hardening.
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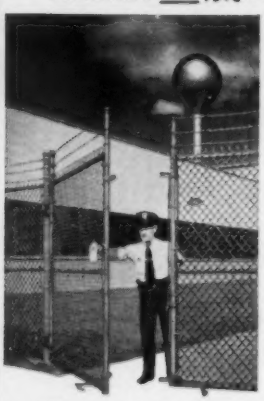

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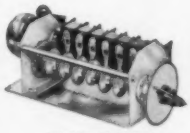

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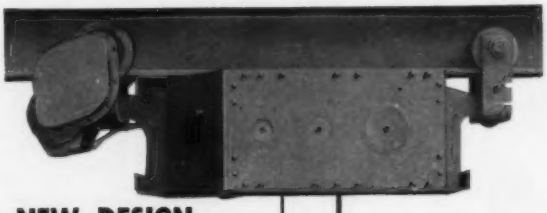

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DATA FILE

(Begins on page 262)

rosion resistance, techniques and skill in manufacture of equipment. Describes rubber and plastic pipe, tubing and fittings; valves; pumps; rubber-lined tanks. American Hard Rubber Co.

477 **Ductile Iron** — Cast iron that can be bent is described in this 28-pp revised edition, with tables, charts and photos. Photos show applications of ductile iron castings, and bulletin lists typical applications in various industrial fields. The International Nickel Co., Inc.

478 **Abrasion, Corrosion Protection** — This 24-pp book illustrates how company's rubber faced steel plate reduces maintenance cost resulting from abrasion or corrosion. Shows case histories in a wide variety of industries. The Gates Rubber Co.

479 **Digital Computer**—Bulletin AB-116 illustrates and describes company's G-15D general purpose digital computer and its digital differential analyzer accessory, which considerably increases versatility and range of operations of the computer. New programming techniques and a complete line of input and output equipment are also described. Bendix Computer Div., Bendix Aviation Corp.

480 **Insect Control** — Featuring manufacturer's insecticides and insect control equipment, this practical 36-pp booklet provides excellent tips on the control of industrial insects. More than 60 pests are pictured along with specific information on where they are found, identifying features, extent of damage, life stages and cycles, characteristics of existence, and recommended control measures. Ten insecticides are discussed in detail. Atomizers, mistorizers and fogging units are pictured and described as to advantages and applications. West Disinfecting Co.

481 **Water-Cooled Stoker**—Design and operating advantages of the Vibra-grate Stoker are outlined in this illustrated bulletin. A large cutaway view details component parts of the stoker and explains operating features. Other drawings show typical installations. American Engineering Co.

482 **Belt Fasteners** — Bulletin F-112A describes belt fasteners designed to join conveyor and elevator belts in every width. Also covers rip plates for repairing jagged rips and tears, scraper plates and applications tools. Contains photos showing installation, selection data, list prices. Flexible Steel Lacing Co.

483 **Production Control System, Procedures** —Publication -1268, 56 pp, details a method of material control intended to result in a shorter planning cycle while speeding production by eliminating cause of delay on the production lines. Illustrated with typical forms and charts, book outlines procedures for engineering, production planning and progress, machine load, material and tool procurement and control. Remington Rand Inc.

484 **Corrosion - Proof Materials**—Bulletin CC-3, 16 pp, gives basic information on company's corrosion proof construction materials, covering chemical and physical data, estimating data and descriptions of products used for acid proof installations in the metal working, chemical, petroleum, pulp and paper and other industries. Included are sections on corrosion proof cements, tank linings, protective coatings, rigid plastic fabricating and rigid plastic pipe, plus a chart showing their resistance to chemicals. The Atlas Mineral Products Co.

Reader Service Cards for ordering catalogs are on pages 257-8. Be sure to include your name, job title, and company, even if you want catalogs mailed to your home address.

485 **Brinemaking Manual**—Details on modern brinemaking methods and equipment are presented in 12-pp Manual 135. Three types of brinemakers are described, as well as a wet salt storage system, and cutaway views and diagrams are included. Morton Salt Co.

486 **Steel Reservoirs, Standpipes**—This 24-pp booklet pictures installation of reservoirs of 50,000- to 10,000,000-gal capacity, having cone, umbrella or ellipsoidal roofs and ornamental structures with special architectural features. Chicago Bridge & Iron Co.

487 **Glassed Steel Reactors** — Bulletin 927, 8 pp, describes glassed steel reactors for processing a wide variety of products under diverse conditions, stressing their versatility as to corrosion resistance, agitation, and temperature-pressure range. Standard specifications are tabulated and dimensional diagrams are included. The Pfaudler Co.

488 **Neoprene Design Book**—This illustrated bulletin discusses the properties of Neoprene, showing how they are utilized in products made from this chemical rubber. Covers its toughness, hardness range, air retention, performance under load, at extreme temperatures, flame and chemical resistance. Eastomers Div., E. I. du Pont de Nemours & Co.

489 **Improved Machine Mounts**—This brochure describes advantages of company's leveling machine mounts. Tells how they enable installation and leveling of heavy machines without bolting or shims, afford increased machine mobility, reduce maintenance costs, and lessen noise. Barry Controls, Inc.

490 **Television Equipment** — Twenty basic applications for "TV Eye" low-cost closed circuit television equipment are described and pictured in Form 3R2335. Folder explains equipment's functions and operation, lists specifications. Radio Corp. of America.

491 **Protective Clothing**—Catalog 12000, 12 pp, describes and illustrates company's line of industrial clothing for protection against water, fire, acids and alkalis, slipping and scuffing. Various types of work gloves and suits and coats are featured, and protective features and advantages of this equipment are pointed out. The B. F. Goodrich Co.

492 **Industrial Finishing Equipment**—Catalog A-657, 12 pp, describes a complete modern finishing system for cleaning, rust proofing, drying, painting and finish baking operations. Typical finishing systems handling a variety of products are pictured and details on how system can be designed to accommodate any product and meet any production requirement are furnished. The R. C. Mahon Co.

493 **Swivel Joints**—Catalog G-4, 32 pp, covers this manufacturer's line of ball-bearing swivel joints as well as other products, including loading racks, manifolding lines, all-metal hose. In addition to providing dimensional and operating data on these products, this booklet is also generously illustrated. Chiksan Co.

fears, fables and facts
about heart disease
"Most heart attacks are fatal."
FACT After a heart attack, the majority recover to lead productive lives.
"You can't work if you have heart disease."
FACT Most can still earn their living... often without changing jobs.
"Murmurs, chest pains and palpitations are sure signs of heart trouble."
FACT Not necessarily... only your doctor can tell.
"Nothing can be done about heart disease."
FACT Some forms of heart disease can be prevented, some can be cured. Doctors can help almost all cases, especially if diagnosed early.
"Women with heart disease should not have children."
FACT With proper medical care, most women with heart disease can bear children safely.
... fight fears with facts ...
help your heart fund...
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Let's Look Into Glass Piping

(Continued from page 140)

tings are available in a number of standard sizes. The pipe ranges in size from 1 to 6 in. in diameter; standard fittings include elbows, tees, reducers, laterals, sink traps and adjustable joints in all sizes.

Actual installation of glass pipe can be done by regular plant maintenance personnel. On a first installation the average pipefitter sometimes tends to under-tighten flange bolts for fear of breaking the glass flanges. This is overcome by instruction in glass pipe installation by our company's field man.

Because of the lightness of the material and the fact that the work is generally cleaner and simpler than metal pipe installation, pipefitters generally prefer installation of Pyrex pipe. The problem of the odd length in installation is overcome by one of the following methods: 1. use of standard odd lengths (6″, 12″ through 120″); 2. spacers; 3. adjustable joints; 4. ordering special odd lengths; and 5. field flanging or beading. A field fabrication kit is available for a nominal cost or rental, and is simple to use. Large users generally purchase these kits, and tutelage by the distributor or Corning of the maintenance personnel in their use is free.

It is important that engineers and installing and maintenance personnel know the limitations as well as the advantages of glass. One of the things to be constantly on the lookout for is the tendency to "overhang" glass pipe and make the hangers rigid. Generally, hangers are spaced every 8 to 10 ft; all hangers should be free swinging with one anchor point in every long run.

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CHEMICALLY RESISTANT, to most acids, alkalis, gasoline and petroleum.

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Tanks, liners, exhaust hoods and ducts, templates, frames, truck bodies and components, partitions, refrigerated doors for cold rooms, ships, railroads, insulation for electronic equipment.

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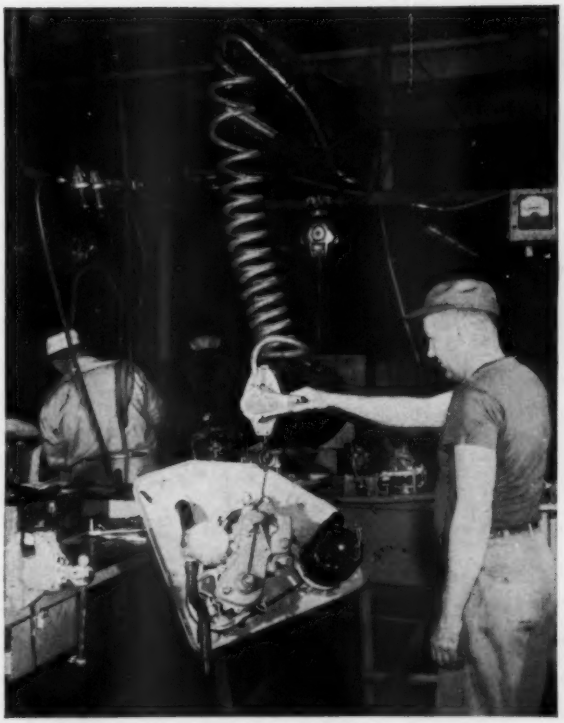

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Air can lighten your lifting jobs...and costs

Air power is changing the way of lifting. Here, Keller Tool one-hand air hoist removes a workpiece from the moving assembly line. After inspection the same hoist puts it back again—gently. There are many lifting jobs in your plant that a Keller Tool hoist can handle—profitably.

Keller Tool air hoists range in lifting capacities from 50 lb. to one ton. Let a Gardner-Denver representative suggest the hoist to fit your handling needs or write us directly for full details.

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- DO A BETTER JOB

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- Precision-cast, aluminum alloy impeller, dynamically balanced to prevent vibration.
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- Top quality motors supplied by nationally recognized manufacturers.

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